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March 10, 1949

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Case History

ON the 1st of March the press carried a dispatch from Moscow which should be required reading for the alumni of the OPA and the high priests of a managed currency in the Federal Reserve Board, the World Fund, and the U. S. Treasury. It should also be of interest to those who believe that all our price problems will yield to the wisdom and integrity of our Executive, provided only that he be given "adequate" power.

For while our cost of living is declining through the automatic and democratic processes of a free economy, in Russia "Stalin Decrees Sweeping Cuts in Food, Clothing, Consumer Goods."

Let's have some background. The Kremlin leaves little to personal initiative. This applies absolutely to production, prices, wages and consumption. All the powers which our own President has been demanding, i.e., rationing, price control, allocation, complete credit control, the Soviet has been exercising since the twenties.

In spite of this, black markets flourish in the communist paradise. The bare quotas which the average citizen is permitted to purchase with his ration cards are not enough to sustain him and his family. In varying degrees it has been necessary for all Russians to resort to "black" or honest markets. The Soviet government, powerful as it is, has been forced to recognize these markets and is in fact itself an active participant. They have been a means of "sopping up surplus purchasing power."

What have been the results? In spite of all those controls which Harry Truman is sure will cure both high and low prices in this country, prices in the Russian free market at the end of 1947 were 12 to 15 times the prewar level. At that time, in what was hailed by liberals as a "currency reform," the Kremlin seized nine-tenths of all the currency, half of all the savings accounts and two-thirds of all the bonds in the possession of its citizens.

According to the communist communique on the current price adjustment, the year-end "reform" resulted in lower prices which "saved" the population "about eighty-six billion rubles." The second stage of price correction now under way will save the population another seventy-one billion rubles. For the purpose of perspective, it may be well to note that total Russian national income, not counting the contribution of slave labor or income in kind going to farm workers and party functionaries, is probably between 450 and 500 billion rubles. These price adjustments are therefore equal to 31 to 35 per cent of the national income.

Among the more striking price reductions which Joe has just decreed are a cut of 30 pct in the price of hay; 30 pct in salt; 28 pct in vodka; 20 pct on "clothes made to order in shops and fashion houses"; motorcycles 15 pct; television sets 25 pct; pianos 20 pct; time pieces 30 pct; and typewriters 20 pct.

Where does this leave the worker? It seems that his wages in rubles have not quite doubled since prewar; that bread, in spite of the Kremlin's heroic price management, costs 170 pct more and butter 147 pct more than in 1939. It takes a skilled mechanic only three days to earn the price of a kilogram of butter. Maybe those "clothes made to order in shops and fashion houses" compensate for the rigors of a Red paradise.

Joseph Stagg Lawrence

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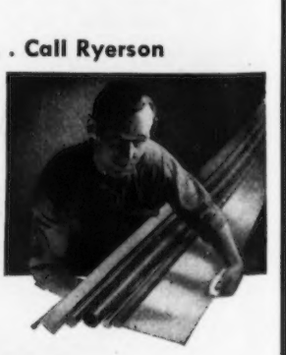

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► Blistered electroplates on zinc diecastings may become a thing of the past if subsequent tests substantiate the results obtained on a few pieces recently. By using a radically different--but simple--cleaning and activating pretreatment, the test diecastings were given an electroplate that withstood 16 hr at 300°F with no signs of blistering, even under a magnifying glass.

► Heretofore dependent on imports for about half its tinplate needs, Belgium is planning to not only become self-sufficient in this respect but to become an exporter. Scheduled new capacity at the Ferblatil plant, financed in part by United States loans, is expected to produce about 20,000 tons above Belgian needs.

► Reports persist that Kaiser-Frazer entry into the low priced field is not too far away and that the motor will be produced by Willys-Overland. Spokesmen for both companies have declined to comment.

► While yield and tensile properties of reduced and electrolytic iron powders to which graphite is added are similar for similar final carbon contents, these same properties are considerably improved by the addition of up to 5 pct Cu to reduced iron plus graphite. Copper addition makes possible a precipitation hardening phase which is additive to regular steel hardening effect.

► The first light weight rolling stock to be used on any railroad in England has been ordered by the London subway systems. An order for 90 aluminum alloy cars was recently placed.

► A 125 hp diesel engine consisting of stampings, copper brazed together, has been under development for over a year. The engine has been pronounced feasible and has successfully passed its major tests. As yet the company has not decided when to start production of the engine.

► Through improved materials alone, a transformer about one-half the size and of equal capacity to that previously used on communication equipment has been developed. The development was made possible by a special electrical quality steel used in the core and by insulating material capable of withstanding operation at 392°F.

► Future use of solar energy for power is suggested as a promising possibility--also a challenging technical problem. Three possible lines of development are: Thermocouples in which an electric current flows between the light and dark ends of a circuit; photocells, as in photographic light meters; and optical concentration of sunlight to provide high temperatures for steam generation or other purposes.

► Some steel salesmen are already reminding customers what they did or tried to do for them during the past few years. This is going over good--when the salesmen's companies really did stick by their customers. But when it is mostly talk it is having a bad reaction. Steel users are going to remember their friends in the future--even if it hurts a little pricewise. Of course if prices in steel hit the skids in a year or so it might be everyone for himself.

► The export market for drill chucks will be reduced substantially this summer when an English plant at Sheffield gets rolling at full speed as a result of American private investment. British requirements have previously amounted to several hundred thousand dollars annually.

► A triple surface protection developed for severe drawing and ironing operations on aluminum alloys is expected to prove valuable in the mass production industries by substantially increasing the number of draws possible before cleaning of the die becomes necessary. The procedure combines a chemical coating for protective and holding purposes covered with a thermoplastic and finally with an extreme-pressure drawing lubricant. The principle may prove equally applicable to steel.

► The Navy is anxious to obtain better strength in the iron castings used in machinery of their sea going machine shops. During the war the shock of direct hits and near misses caused many such castings to break. Men below deck often had to duck flying machine tool parts as well as bullets.

► After 14 months of service in handling 108,000 cu yd of sharp sand, a 5/8 cu yd aluminum drag line bucket, in use in England, has been removed from service for repairs. The bucket, which is said to have outlasted four steel buckets, has a steel lip plate. It is estimated that an additional 9 months of service will be obtained after repairs are completed.

Significance of Speed

By JOHN H. HRUSKA
Consulting Engineer, Hinsdale, Ill.

A WESTINGHOUSE Weldomatic, with two welding heads (top) is in use in an automobile plant; the Lincoln unit (center) is used in the welding of heater sections at speeds up to 100 ipm; and the two GE heads (below) are used for fabricating large crane girders at one of the Whiting Corp. plants.

EARLY in 1936 experiments were made to discover the fundamental laws governing penetration phenomena in submerged arc welding. It soon became apparent that the amount of deposited metal was best expressed as the volume of weld metal—not the weight—deposited per time unit and for an accurately measured current or energy input. During these tests, the conditions were selected to permit comparison of any of the results. The composition, average grain size and height of the layer of welding flux were as near identical as possible, and the chemistry and physical characteristics as well as the preparation and thermal conditions were also nearly the same.

Under such precautionary measures, automatic arcwelding affords a clear evaluation of the principal factors under which welds by most of the commercially exploited processes are produced. The current input together with the resultant thermal reactions and ultimate dimensional peculiarities of the weld and its thermal zone are then readily studied if based upon some easily measurable unit of time.

Experience suggested that all calculations are most conveniently carried out if the values are reduced to 1 min intervals. This is contrary to many investigators who report welding data on a "per hour basis," which method seems somewhat irrelevant since no machine or procedure is known to deposit metal for so long an interval. Besides, processing is readily adjusted if results are based on multiples of 1 min performances.

The desired information on the electrical current was obtained by following this outline: Intensity and voltage were read from the calibrated ammeters and voltmeters of the welding machines used. The time of travel of the welding

In Automatic Arcwelding

heads was checked by a stop watch to tenths of a second and the recorded welding speed, in ipm, was thus verified against the settings of the machine used. Nominal diameter and type of wire, flux characteristics in case of the submerged processes, grade and percentual amount of electrode coatings for the visible arc procedures and the scarfing and preparation of the weld samples under scrutiny were all carefully ascertained, even though not fully covered in this report.

After welding and subsequent cooling, transverse specimens were cut from about the middle of the weld plate, the cross-sectional area being then ground and polished for etching with a 20 pct solution of ammonium persulphate in distilled water. These specimens were immediately photographed in actual size with the now customary inch and millimeter scale included for future checking of magnification. The resultant photomacrograph, together with some of the pertinent figures, was combined into a data sheet, all of which sheets were ultimately filed under headings of various processes.

The macrographs representing each test served another purpose. The cross-sectional areas of the weld and of its corresponding thermal zones were measured twice by a calibrated planimeter and the average of the two determinations included in the data sheets. It was particularly for this reason that such care was taken in obtaining dimensions as accurately as possible. The bevel area was calculated from the known geometry of the joint just before welding. All plates and their etched cross-sectional specimens were critically examined for any deficiencies in homogeneity, such as incomplete fusion, undercutting, porosity, etc. The final dimensions of the weld, especially the total height, maximum width, reinforcement, were also determined.

From the beginning it was apparent and justified to compare the reactions under which melting of welding electrode, parent metal and slag forming materials occur to those in the manufacture of steels in the electric arc furnace. The hearth of such a furnace is comparable to the fusion line or the contour of the unfused portion of the joint. Moreover, the top or horizontal surface of nearly any automatic weld has become an exceedingly reliable criterion of important mass effects during the deposit and following solidification of the fluid matrix.

Any alert operator of automatic equipment has observed even in the earliest stages of machine welding, that excessive speeds would produce a shallow valley in the top center and in the direction of travel, whereas too slow a speed would pile up the metal. Technicians and designers were much interested in these findings because such uniformly produced and readily controllable outlines of weld surfaces enhanced proper stress distribution in a weldment. Analysis of the macrographs and welding data representing the principal processes may substantiate the author's contention that not only size but also the geometry of an automatic weld are equally important for high quality joints.

Upon striking a visible or invisible arc, metal begins to melt from the tip of the electrode and from the parent stock. The thus formed puddle moves slowly but at constant speed under an

Academic welding research into problems of crack sensitivity of parent metals and welding rods, low temperature shock resistance and other metallurgical properties, may often obscure the fundamentals in making good welds. Real progress was made only when the speed factor in welding, by manual or automatic processes, was given attention. Design factors probably rank next in importance. Investigations and results of such research are described in this article.

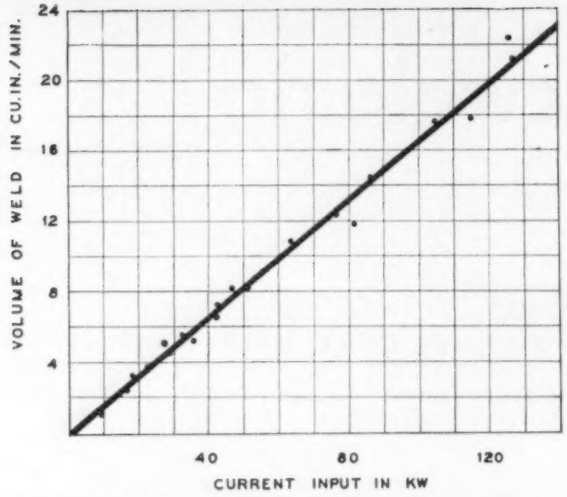


FIG. 1—Graphical relationship between current input and weld volume per minute for the submerged arc welding.

equally constant energy input, hence fusing, mixing and depositing weld metal also at a reasonably constant rate. If the current or its thermal equivalent is insufficient to fill the groove with an adequate amount of fluid weld metal, a downward curve on top of the cross-sectional macrograph will indicate that condition. On the contrary, if more electrical energy is used to melt more metal than to fill the groove the weld will *pile up* as reinforcement. Engineering requirements of a nearly perfect flat surface of the weld may then be produced by adjusting the variables between the two extremes. The existence of a clear and definable relationship of the volume of fluid metal deposited per time unit to the energy input was thereby established some 12 years ago.

Table I summarizes a few of the conducted experiments with submerged arc welds together

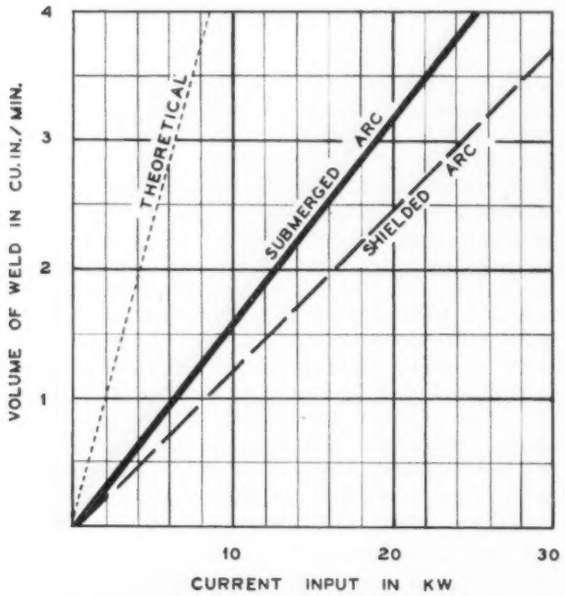


FIG. 2—Correlation between current input and weld volume per minute for the submerged arc and shielded arc welding processes.

with the simple calculations used in this study. As indicated, the cross-sectional areas were determined planimetrically and the volumes obtained by multiplying area with the actual speed of welding and reported as "Volume of deposited weld metal per minute." The figures for energy input, in kw or joules, were then correlated with the corresponding volumes of weld as shown in fig. 1. The validity of the above mentioned trend is evidenced from the linear ratios, which, incidentally, apply to any of the known submerged arcwelding processes. For camparison, a similar line for automatic arc welds produced by coated electrodes fed to the work from standard coils of such wire is included in fig. 2.

Discussion of Results

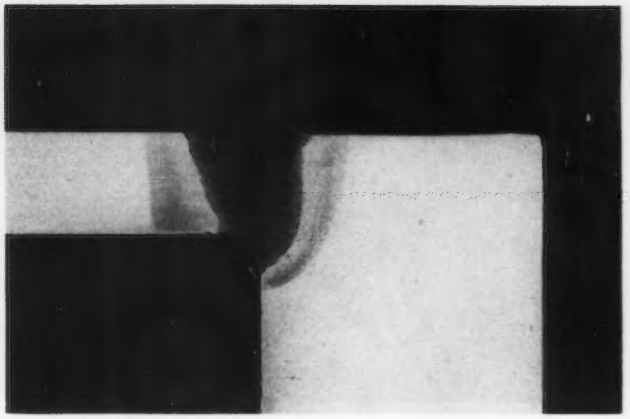
Nearly all automatic arcwelding methods will produce butt welds, fillet welds and plug welds of some specific contour, but generally of a size commensurate with heat input and welding speed. The selection of the most suitable and most economical process for joining ferrous and some nonferrous materials becomes then predominantly a function of grade, thickness and general size of the parts to be welded. Maximum possible speed and uniformity of results recently have become factors of first importance whenever considerations are given for automatic and repetitive operations in arcwelding. The production data in table I become valuable criteria in justifying such decisions. However, it can be illustrated more clearly by referring to one of the usual and otherwise controversial points.

The present study has indicated that about 28 pct more volume of weld metal is deposited by submerged arcwelding than by the automatic shielded arc processes for the same kw input. That fact could prove tempting for more general adoption of the submerged arc process were it not for the inconvenience that, for example, in making butt welds requiring complete penetration, the weld must be backed-up to prevent the molten weld metal from running through. Backups often necessitate such elaborate equipment as to even question the suitability of the process for certain applications. On the other hand, multiple layer weld deposits may cost more to produce than a single pass by means of backed-up submerged arcwelding, especially for very heavy plate or parts. In spite of these considerations covering obvious economics and convenience, the influence of speed upon shop operations is nearly always uppermost in the minds of those directly responsible for deciding upon the actual procedure of welding.

The individual findings and diagrammatic summaries of tests of welding speed and its effect on welds have served in numerous instances as time saving data for design purposes or for new welding jobs requiring special joints without much preliminary experimentation. Through these tests, it has been possible to suggest machine settings and volumes of bevels with such accuracy as to eliminate any final corrective measures during actual production.

An example from the files of successful welds may illustrate that statement. The fabrication shop was called upon to make an edge joint be-

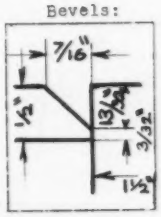
tween a ½ in. plate and a 1½ in. plate. The angle of the edge was 90° and a single pass from the outside was highly desirable because of complications in welding sequence if an additional fillet weld became necessary. It seemed expedient to bevel only the ½ in. plate with a 45° scarf and with a 3/32 in. lip. A solid copper bar as back-up, having a ¼ in. radius as one corner, was snugly fitted into the assembly. The recommendations finally called for a current input of 1000 amp and 36 v, which is equivalent to 36 kw, at 18 ipm. The volume of weld metal deposited per minute should then be 5.85 cu in. with a corresponding weld area of 0.33 sq in. The weld was actually produced at 995 amp, 36 v, 35.9 kw, 18 ipm, and its cross-sectional area was verified at exactly 0.38 sq in. including the fillet area. The outline satisfied the designing engineers, the quality was fully acceptable by the metallurgists. No cracks, undercuts nor other non-homogeneities were present. The photomacrograph in fig. 3 should justify their viewpoints.



WELDING DATA

Weld Test No.	806
Met.Inv.No.	—
Sample No.	6
Grade of Steel:	NI-CR-MO
Current Intensity:	995 Amps.
Current Voltage:	36 V
Current Input:	35.9 Kw
Welding Speed:	18 in./min.
Type of Electrode:	OXWELD #41
Diam of Electrode:	1/4 in.
Flux:	20 x 200
Width of Weld (w):	0.69 in.
Height of Weld (h):	0.81 in.
Width-height ratio (w/h):	0.70
Area of Weld:	0.38 sq.in.
Area of Thermal Zone:	0.18+0.16 sq.in.
Weld-heat zone ratio:	1.12
Area of Bevel:	0.087 sq.in.
Volumetric Penetration:	234 %
Number of passes:	1
Weld made by:	—
Date of Weld:	—

Bevels:



ROD SPEED: 110"/min

FIG. 3—Welding data for automatic corner weld produced by the submerged arc process.

Another development originated from the practical use of some of the mentioned tests. At first considered impossible, weldments of special alloyed steels were produced with available straight carbon welding wire, but by adding filler wire of known composition and specified diameter into the groove. This filler is melted by the welding current, and mixed with the electrode and parent metals in known proportions. The resultant weld metal often approaches in chemistry the parent metal with frequently amazing similarity. Such parts may then be heat treated without much attention to the welds.

As to the most convenient method of adding alloying elements to the joint, it has been found best to use pure (99.8 pct plus) nickel, 19-9 and 25-20 stainless wire, molybdenum wire of highest obtainable Mo-concentration for the direct addition of their predominant elements to welds. Manganese and carbon are best introduced through the medium of the granular flux, but allowances must be made for substantial loss through combustion and slagging. If metallic additions are made by means of filler wire, the latter is tacked slightly near the bottom of the bevel, thus permitting a better mixing during fusion. The cross-sectional areas of the wires are deducted from the area of the bevel, but final percentages of elements are calculated from the weld volumes per min. taken from fig. 1. Special procedures have been worked out for weldments intended for heat treatment to certain hardness values, carburizing, induction hardening, etc. Some of these methods were initiated as war emergencies during shortages of alloyed welding wire and have been used since.

In fig. 4, which shows one of these welds, the weld area is 2 sq in. and the bevel area is 0.742 sq in. The cross-sectional area of the two 5/32 in. diam filler rods was 0.038 sq in., leaving a reduced bevel area of 0.704 sq in. The area of parent metal fused or penetrated during the

TABLE NO. I

Production Data for Some Welds Made By the Submerged Arc Welding Process

Amperes	Volts	Kw	Speed, Ipm	Area of Weld, Sq in.	Volume of Weld, Cu in. per min.	Type of Weld
300	33	9.9	15	0.06	0.9	Fillet
500	33	16.5	15	0.16	2.4	Fillet
500	35	17.5	15	0.23	3.5	Butt
680	36	24.5	31	0.12	3.7	Butt
800	37	29.6	24	0.19	4.6	Butt
840	33	27.7	20	0.26	5.2	Butt
900	30	27.0	48	0.11	5.3	Irregular
950	37	35.2	20	0.25	5.0	Butt
1,000	33	33.0	12	0.46	5.5	Butt
1,000	43	43.0	12	0.54	6.5	Fillet
1,100	43	47.3	12	0.69	8.3	Butt
1,125	45	50.6	14	0.58	8.1	Fillet
1,400	30	42.0	8	0.91	7.3	T-weld
1,600	40	64.0	11	1.00	11.0	Butt
1,700	45	76.5	8	1.54	12.3	Butt
1,700	48	81.6	9	1.31	11.8	Butt
1,800	48	86.5	9	1.59	14.3	Butt
2,300	50	115.0	5	3.56	17.8	Butt
2,300	55	126.5	5	4.48	22.4	Angular
2,400	53	127.2	7	3.23	21.6	Butt
2,500	42	105.0	4.5	3.94	17.7	Butt

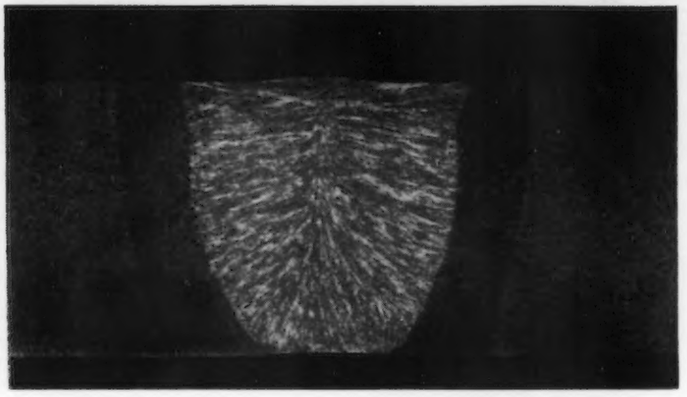


FIG. 4—This automatically produced arc weld in a heavy plate was alloyed by means of filler rods.

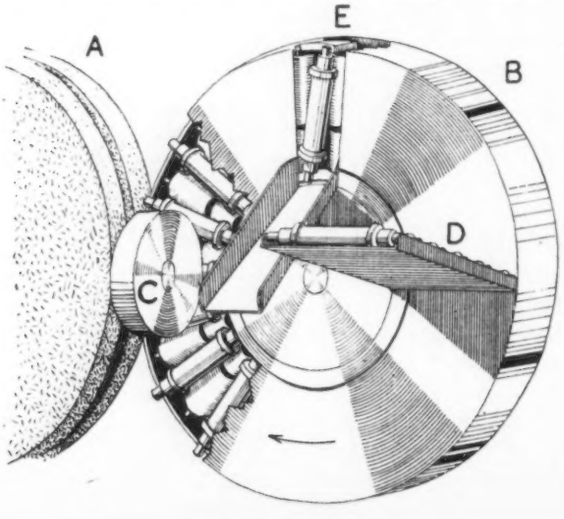
automatic process was 1.296 sq in., which is equivalent to 184 pct volumetric penetration. It was desired to approach the plate composition with 1.17 pct Cr and 0.07 pct V. Using the areas above mentioned and a special 19-9 stainless wire, the weld actually averaged 1.15 pct Cr and 0.07 pct V, in addition to 0.41 pct Ni and 0.56 pct Mn.

Perhaps a few cautionary remarks should still be added in using the values read from figs. 1 or 2, at least for submerged arc welds. To achieve the highest possible quality of the thus produced welds, all machine settings should result in such kw input and weld volume per minute as to represent their graphical relationship by points almost on the straight line. It has been found by costly experiments that marked deviations from that linear correlation will be accompanied by insufficient fusion or low profile for welds falling below that line, whereas those above it are prone to bulge and overflow. The latter type welds are sensitive to internal cracking, which trend is particularly noticeable for certain alloy steels or grades with higher carbon concentrations, or those steels with more pronounced hardenability.

End Form Grinding Machine

CERTAIN part details require a profiled grinding on the end so that they cannot be ground on any normal centerless grinding machine because of wheel wear and breakdown or the difficulty of truing such a profile with any normal truing attachment. A novel variation of the centerless grinding technique is an end forming machine developed by Arthur Scribener, Ltd., Birmingham, England. In certain features, the new machine is a variation of the conventional centerless grinder.

In the illustration the principle of operation is readily recognized. **A**, the grinding wheel is dressed to required profile by any suitable wheel truing attachment. **B** is a rotating work carrier that presents the pieces to be machined at right angles to the face of the grinding wheel. **C** is a small abrasive control wheel that imparts the requisite rotary movement to the piece during grinding.



The operation is entirely automatic, the pieces being fed to the rotating work carrier down the inclined chute, **D**, and when the work is ground, the piece is ejected by a cam down the delivery chute, **E**. The feeding chute is made in such a manner that the pieces have to be inserted correctly and it is also provided with a baffle which lifts to permit the passage of a single part to the rotating carrier. The carrier rotates clockwise at a very slow speed and before the piece contacts the grinding wheel axial rotation is imparted to it by the control wheel, **C**, which is held against the part by spring pressure.

By dressing the wheel to various contours, parts of different shapes can be ground. The design of the rotary cage or work carrier depends upon the part to be ground, and in the example shown consists of a large circular drum carrying a series of rollers mounted on the face in such a position that one workpiece is supported between each pair of rollers with its axis radial to the drum. One machine used in a bicycle plant for grinding the ends of bottom bracket axles produced 1800 parts an hr.

The N:S Relationship in Endurance Testing

By MICHAEL G. CORSON
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Seeking to reduce the time factor in endurance testing, the author has developed an equation whereby results can be calculated. Accuracy of the equation is indicated by applying it to published data obtained by conventional testing methods, and, as described in this article, the equation can be employed for both ferrous and nonferrous metals.

THE absence of a definite mathematical concept of the phenomena of fatigue in metals makes necessary as many as 500 million reversals to find the safe stress for nonferrous metals and some 50 million reversals in the case of steel.

To overcome this time-consuming procedure the author has developed the following equation, which also permits the calculation of life expectation for a given overload (over the absolutely safe stress), or, the stress which the material would endure for a given length of time:

$$N = \frac{A}{(S - K) \cdot d^{(S-K)}}$$

where K is the safe stress under the given velocity of reversals ($S-K$) is the overload, A is a constant having basically the dimension of time, and d is the factor of "deficiency of adjustment" (embraces lag in adjustment of the plastic strain between reversals).

To employ the formula, one has to first determine the three factors, A, K and d. This can be done in the following manner:

(1) Perform the tests under three stresses, S_1, S_2 and S_3, so chosen that the increments are equal and the numbers of reversals to failure are of the order of 1 million to 20 million. Run at each stress as many tests as needed to obtain satisfactory averages and reliable minimum values of N_1, N_2 and N_3. The relative precision of the N terms is greater at higher values and it should take only about three tests at the lower S used; perhaps six tests at the intermediate and as many as ten tests at the upper value of S. In total, about 100 million reversals may be required to obtain a reliable set of three pairs of N/S data, which would mean about 25 days using a single endurance testing machine of 3000 reversals per min.

(2) Form and solve the quadric equation:

TABLE I

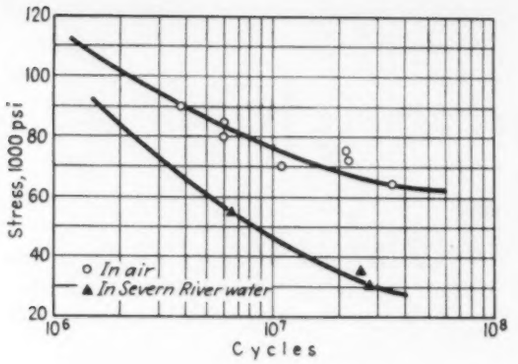
N:S Relationship for Two Types of Carbon Steels

0.02 C Steel (Hot-Rolled)		0.52 C Steel (Normalized)	
N	S	N	S
30,000	35,000	30,000	55,000
140,000	30,000	90,000	50,000
10,000,000	25,000	400,000	45,000

TABLE II

N:S Relationships for Annealed Brass (grain size 0.200 mm) and Cold-Rolled Brass

Cold Rolled Brass		Annealed Brass	
N	S	N	S
480,000	60,000	270,000	20,000
800,000	50,000	550,000	17,500
1,740,000	40,000	1,300,000	15,000



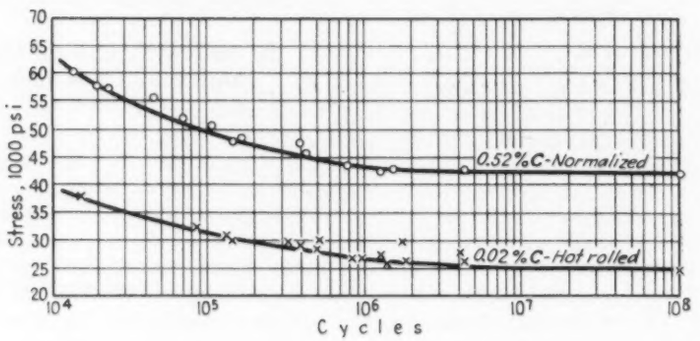
ABOVE

FIG. 1—Rotating cantilever endurance tests of beryllium-nickel alloy rod.

o o o

RIGHT

FIG. 2—Typical stress-cycle curves of a hot rolled and a normalized steel.



about 118,000 psi. The equation, however, indicates an expectation of 1.25 million reversals at 130,000 psi.

The lower graph of the same diagram tends to represent the N/S relationship in brackish water. It is based upon too few tests to give a reliable set of N/S values and shall be used merely as an example. That curve yields the values; 5 million at 60,000 psi; 8.5 million at 50,000 psi and 15 million at 40,000 psi.

Forming the quadric equation in the same way and neglecting smaller fractions one obtains the equation: $3\ K^2 - 300\ K = 0$, which means that K is zero; i.e. there is no safe limit of stress for that metal when working under a rapid reversal of stress in brackish water.

$N_1 N_3\ (S_1 - K) \cdot (S_3 - K) = N_2^2 \cdot (S_2 - K)^2$ and use the lower root for the true value of K.

(3) Insert the K value in equation:

$N_2 : N_1 = d^{S_1 - S_2}\ (S_1 - K) : (S_2 - K)$ and solve it in order to find d (or its log).

Placing the values of K and d in the basic equation, one obtains the value of A. In this manner one obtains a formula that permits a computation of either N for a given S, or an S for a given N. Extrapolation is possible to a considerable extent above the S values used in the tests, and would actually cover the range to ultimate tensile strength except for the fact that at very great overloads the plastic adjustment between reversals, in a rigid system, interferes with the smooth action of its mechanism and causes an early and erratic fatigue.

The above equation was tested for numerous published data and produced consistently accurate results. Consider, for instance, the case of a heat-treated beryllium-nickel alloy, fig. 1.[1] From the diagram one notes the following corresponding values of N and S (tested at 1450 reversals per min). 3.9 million for 90,000 psi, 7.5 million for 80,000 psi, and 20 million for 70,000 psi.

Using this data, the first relationship will be

$3.9 \cdot 20\ (90 - K)\ (70 - K) = 56.25\ (80 - K)^2$

$K^2 - 160K + 6000 = 0;\ K = 60{,}000$ psi

The second equation; $7.5/3.9 = d^{10} \cdot 30/20$ yields a value of 1.28 for d^{10}, or $log\ d = 0.01072$.

The equation; $3.9 \cdot 10^6 = \dfrac{A}{30 \cdot 1.28^2}$, yields the value of 246.10^6 reversals, or 170,000* min for A.

The N/S curve given in the diagram obviously approaches asymptotically the value of 60,000 psi as found above. On its upper (extrapolated) end it would strike the line of 1 million reversals at

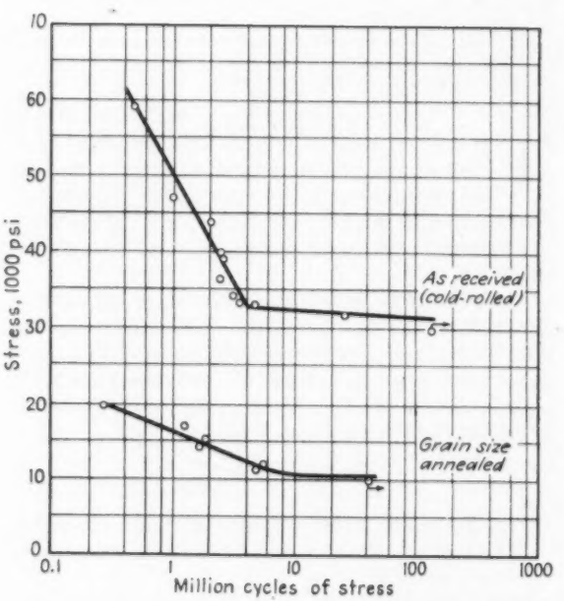


FIG. 3—S-N curves for cold rolled brass and annealed brass.

This result is quite logical. A protective layer can hardly form if the stresses are continuously and rapidly reversed and the corrosion will continue, no matter how small the stress. Consequently, in the cases of corrosion-fatigue one need not seek K and the basic equation is reduced to: $N = A/S \cdot d^S$.

Two sets of tests at two definite stresses would suffice to find the values of A and d and to make

possible an estimate of the life for a given stress or the stress for a given life.**

It should be added that only a test under an infinitely great velocity of reversals would entirely eliminate the plastic adjustment and result in finding that value of K which is precisely equal to the true elastic limit of the material. Running the endurance tests on the three machines, with say 600, 3000 and 12,000 reversals per min, will establish the effect of testing velocity upon K, d and A and will extend the scope of the method.

** The figure of 170,000 min means that an overload of 1000 psi (above 60,000) will cause a failure in about 118 days of continuous running.*

*** In this particular case d = 1.42 and A = 2460 million reversals. Assuming the working stress to be 10,000 psi a life of 173 million reversals, or about 83 days, would be anticipated.*

The endurance equation can also be applied to hot-rolled and to normalized carbon steels (see fig. 2).[2] N and S values from the diagram are listed in table I. The resulting equations for the value of K are:

$K^2 - 160\,K + 874 = 0$; $K = 24.9$ thousand psi (0.02C, hot rolled)

$K^2 - 100\,K + 2423 = 0$; $K = 41.2$ thousand psi (0.52C, normalized)

By combining the first two sets of N/S values for each steel, $\log d = 0.0742$ and $A = 1.7$ million for the 0.02 C steel, and $\log d = 0.0567$ and $A = 2.5$ million for the 0.52 C steel. Then, inserting $\frac{1}{2}$, instead of N, in each of the two equations: $N = 1.70 \cdot 10^6 / (S - 2419)\ 1.187^{(S-2419)}$ and $N = 2.5 \cdot 10^6 / (S - 41.2)\ 1.140^{(S-41.2)}$; 89,000 psi is calculated as the true cohesive strength of the 0.02 C steel and 125,000 psi for the 0.52 C steel. These figures by no means contradict the assumed or expected values of true cohesion stress for the two materials.

Another illustration can be had from the results of a recent investigation of the fatigue limit of brass by Walker and Craig,[3] who found N:S relationships (see fig. 3) as given in table II. The resulting equations are:

$N = 21.7 \cdot 10^6 / (S - 29)\ 1.0114^{(S-29)}$ (hard rolled brass)

$N = 10.35 \cdot 10^6 / (S - 10.85)\ 1.170^{(S-10.85)}$ (annealed brass)

Equating N to $\frac{1}{2}$, an S value of 90.5 thousand psi is found to be the true cohesive strength of the annealed grade, while the corresponding S value for rolled brass is 975 thousand psi. This equals 70 thousand kg per sq cm, which lies between the values of interatomic cohesion of 105 thousand kg for copper and 60,000 for zinc computed by the author from compressibility data published by Bridgman.[4]

Of interest also is the low value of d for cold-rolled brass. It is much closer to 1.0000 (perfect capacity for plastic adjustment) than are the normalized steels and annealed brass. This feature is common to all cold rolled metals and alloys. It explains why hard drawn wires are a better material for cables than wires of heat-hardened materials.

References

[1] W. Lee Williams, "The Heat Treatment and Properties of Some Beryllium-Nickel Alloys," Trans. ASM, vol. XL, 1948, p. 173.

[2] Frank T. Sisco, "Alloys of Iron and Carbon," vol. II—Properties, published by McGraw-Hill (for Engineering Foundation), p. 386.

[3] H. L. Walker and J. W. Craig, Tech. Publ. 2478, AIME, September 1948.

[4] P. W. Bridgman, International Critical Tables, Proc. of American Academy of Arts and Sciences, vol. 70, 1935.

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"Wear as Applied to Cylinders and Piston Rings." Findings of a 10-year research project devoted to the reduction of cylinder and piston ring wear in engines are reported in this book. Information on the test setups used and on the metallurgy involved is given. Suggestions on engine design for most effective cylinder cooling and lubrication are forwarded. Cooper-Bessemer Corp., Mt. Vernon, Ohio. $3.50. 129 p.

* * *

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* * *

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* * *

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* * *

"Chemical and Electro-Plated Finishes," by H. Silman. Book deals with the finishes commonly applied to metals for decorative or protective purposes from aqueous solutions, with or without the use of the electric current. Corrosion, descaling and pickling, polishing, the finishing of light alloys, testing methods and the electroplating of a number of metals are among the subjects covered. Sherwood Press, P. O. Box 566, Pacoima, Calif. $10.00. 414 p.

• • • Triple Surface Protection For

A chemical, plastic and extreme pressure lubricant treatment of aluminum has been developed for drawing and ironing aluminum alloys where galling of dies and scoring of shell surfaces characterize the severe combination of these operations. Preparatory treatment as well as the method of application of the three prescribed surface treatments are described.

A TRIPLE surface protection procedure has been developed for severe drawing and ironing of aluminum alloys. The procedure may prove valuable to the mass production industries. Its purpose is to minimize the detrimental galling of dies and scoring of shell surfaces that characterizes the severe combination of drawing and ironing operations.

The procedure combines a chemical coating for protective and holding purposes, to which is added a tough and pliable thermoplastic coating; then an extreme pressure lubricant is applied to take care of sliding friction. The research applies to alloys of aluminum, but it seems reasonably certain that the principles are equally applicable to steel for similar purposes.

This triple protection process was developed by Sam Tour & Co., New York, in connection with a project sponsored by the Ordnance Dept.'s Pitmann-Dunn Laboratory of Frankford Arsenal.

This process involves the application of three thin layers of protective coatings, together, have the durability and cohesive qualities to withstand the extraordinary flow conditions existing at the critical line of entry of metal into the die. The order of testing demonstrated the need for all three.

A number of alloys were being drawn experimentally in a series of operations, as shown in fig. 1, which required both the reduction of diameter and the reduction of wall thickness. The work hardening of the metal was necessarily severe. The conditions, as is normal in such work, provided a combination of pressure and temperature favorable to the adhesion to the surface of the die of particles of the metal being drawn. Such particles then scratch the walls of subsequently drawn shells and accumulate into larger and larger adhesions with consequently deeper scoring, as illustrated in figs. 2 and 3.

The first trials were with the usual extreme pressure (E-P) drawing lubricants recommended for the working of aluminum. Pickup or galling began with the first cup being drawn and ironed. The pickup increased rapidly until the resulting cup walls were scratched most of the way around as shown in fig. 2. This happened within the drawing of half a dozen cups. The reduction of wall thickness in this operation amounted to about 25 pct. Other trials with different lubricants did not materially alter the results.

The next step was the consideration of chemical treatments that coat the surface of the metal with a thin layer of phosphate, chromate, or oxide

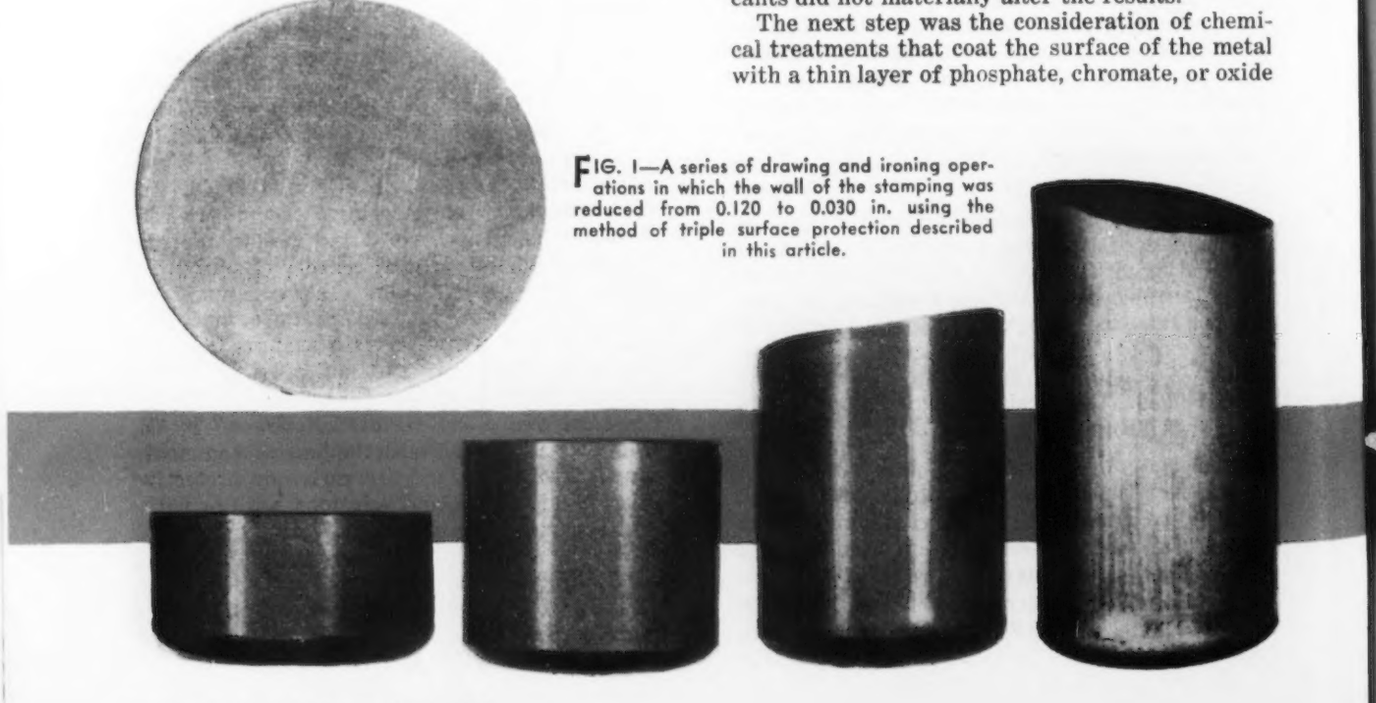

FIG. 1—A series of drawing and ironing operations in which the wall of the stamping was reduced from 0.120 to 0.030 in. using the method of triple surface protection described in this article.

Drawing and Ironing Aluminum • • •

By E. V. CRANE, S. BATTAGLIA and H. ROTTERSMAN
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or a combination of these, both as a protective layer and as a base for the better holding of the lubricant. The double protection afforded by the chemical coating plus the lubricant improved the situation and increased, substantially, the number of cups drawn before it was necessary to clean the dies. This might have been adequate for limited requirements of test lot production, but would obviously not be satisfactory in mass production.

The next step was suggested by the practices in severe drawing and ironing operations on steel and in the similar problem of redrawing steel tubing. In such work it has proved advantageous to use as protective coatings a variety of natural and synthetic plastic coatings, either clear or mixed with such load carrying fillers as graphite and chalk. For this experiment a nitrocellulose type of lacquer was chosen and was used without filler. It first was applied directly to the clean metal which was then drawn with lubricant. The results were quite good but some pickup did occur.

The preparation was then altered combining the protective coatings. That is, the chemical coating was applied first, both as a protection and as a base to hold the lacquer. The coating of lacquer was kept thin and lubricant was applied over it for the drawing and ironing operations. This triple protection of chemical base coating plus lacquer plus lubricant proved remarkably tough and durable.

The triple protective coating method was used with the 24S, 52S, 61S and 75S aluminum alloys.

The blank and cups shown in fig. 1 were prepared in this manner and the wall surfaces are typical of the results obtained.

The Alodine process[1] of the American Chemical Paint Co., Ambler, Pa., is a rapid and economical method for producing a hard protective, skin-like coating on aluminum and aluminum alloys. It combines simplicity of procedure and economy of means with highly effective protection.

[1] *"New Surface Treatment for Aluminum,"* THE IRON AGE, *Dec.* 5, 1946.

Alodizing requires no electricity and only a minimum amount of equipment. The Alodine is most simply used in an immersion process, it can also be applied by spraying or flow coating. Any combination of the various alloys can be treated in the same solution.

The several stages of preparatory treatment requires a certain amount of care in control, but

FIG. 2—Scoring of aluminum alloy, uncoated, using extreme pressure lubricant.

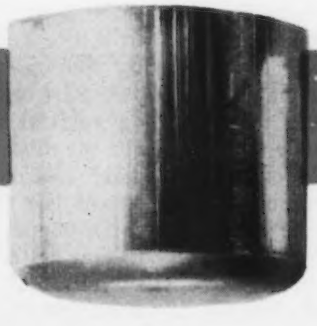

FIG. 3—Rapid increase of scoring after only a dozen stampings with E-P lubricant.

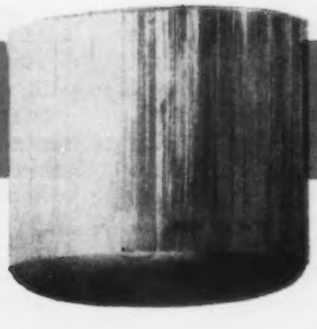

FIG. 4—Coating slippage resulting from improper adherence of basic chemical coat, permitted scoring until coating procedure was improved.

all lend themselves to the continuous or batch methods commonly employed in production. The series of operations employed were:

(1) Rinsing of annealed cups as received from the salt bath, using running water. The salt bath was used for annealing the drawn cups whenever desired. The bath also effectively removed the protective lacquer and lubricant from the previous operation.

(2)[2] Clean in Deoxidine solution (American Chemical Paint Co.) by 4 min immersion at 70 to 80°F.

(3)[2] Dip in 50:50 nitric acid solution. (This operation applied to the copper bearing alloys of aluminum only, as they discolor with a smutty appearance in the Deoxidine).

(4)[2] Water rinse.

(5) Dip for coating, 2 min in Alodine solution (American Chemical Paint Co.) at 120°F. Drain and debead.

(6) Water rinse. Dry.

(7) Apply lacquer coating either by brush or dip method. The brush blend consists of: 2 parts by volume of a nitrocellulose type of lacquer to 1 part by volume of thinner.

The dip consistency for the lacquer coating is a 1:1 mixture by volume of lacquer and thinner.

(8) Dry.

[2] *Steps 2, 3 and 4 may be omitted if the product is thoroughly cleaned in Step 1.*

Where the stamping were not properly handled throughout the perparatory treatment, the Alodine coating did not thoroughly adhere to it. That is, the Alodine coating and the lacquer coating upon it, both loosened during the drawing operation. This resulted in areas of bunched lacquer and Alodine particles as shown by the dark areas in fig. 4. Similar patches adhered to the die surfaces and were removed by use of lacquer solvent. The cup surface became scratched during the drawing operation when the Alodine peeled. Satsisfactory Alodine coatings were obtained by more careful control in the preparation of Alodine solutions and by proper handling of the stampings according to the above Alodining procedure.

FIG. 5—After heat treatment of aluminum alloy stamping the black furnace residue proved the best base for the lacquer for subsequent redrawing.

In some instances with the 24S and 75S, two heat-treatable aluminum alloys, there was a further reduction performed after heat-treating.

To provide a surface protection for the reduction after heat-treatment, it was found that the best solution was to leave the Alodine coating on the stamping during the heat-treating operation. The heat treatment left a black residue on the stamping to which lacquer and lubricant were applied. This residue and lacquer coating did not peel during the drawing operation, as illustrated by the part in fig. 5.

It may be concluded that consideration should be given to the triple protection system combining chemical treatment of the stamping to form a protecting and retaining coat plus a thin adherent layer of tough synthetic coating plus a suitable lubricant. The system offers advantageous protection for dies and stampings in severe combinations of drawing and ironing. There is some flexibility in choice of commercially available constituents. The means of progressive treatment and application in industry are well worked out and readily subject to combination for the particular purposes to be served.

Combatting Industrial Air Pollution

ULTRASONIC precipitation, although still under development, has demonstrated high effectiveness with small particles from 15 microns to below 0.01 micron in diam, according to the *Industrial Bulletin* of Arthur D. Little, Inc. High-frequency air vibrations set up by a special siren cause small particles of, say, carbon black, to collide and agglomerate to a size which can be caught by conventional cyclones. Such units are said to cost less than electrostatic equipment, with operating costs of the two being comparable.

The technique is not as efficient, however, for dust concentrations below 1 grain per cu ft. Industrial applications include collecting carbon black, acid mists, rock fines and paper pulp mill waste.

Ultrasonic precipitation is also being considered for smokestacks.

Another method for capturing fine mists is still in the experimental stage. A mist-bearing gas stream is sent up through a vertical shaft containing a powder which absorbs the mist. The stream bubbles through the powder as through a liquid, but does not carry it out of the shaft. Cleanup of sulfuric acid mists with 95 pct efficiency has been reported for laboratory tests. The relatively large particles of the "fluidized" bed might perhaps also be used to collect finer solids.

Mounting Metallographic Specimens At Room Temperature

By HERBERT S. KALISH
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IT is frequently necessary to examine a metal or alloy metallographically without the use of elevated temperature or pressure. This is common in the case of low melting point metals or alloys, soft metals, metals which recrystallize at low temperatures, and alloys which age harden at room temperature or change structurally at temperatures slightly above room temperature.

The mounting method described in this article was developed in investigating the microstructure of various lead alloys and the hardness of storage battery grids. Grids are often very small in cross section and while the heavier portions could be microtomed for examination, it was impossible to make hardness determinations. Even the heaviest of grid sections are too thin to make anything but microhardness measurements. Clamps could not be used, since the alloys are so soft they would be cold worked by clamping. Mounting of specimens at room temperature was an absolute necessity.

Of various plastic materials tried for this purpose, polystyrene proved to be most successful. Styrene monomer is a watery appearing liquid which can be polymerized to a hard clear colorless material with benzoyl peroxide. Complete polymerization of the styrene monomer takes from one to two weeks at room temperature using from 1 to 5 pct catalyst (benzoyl peroxide). It was found impractical to use greater amounts of catalyst than 5 pct, and 1 pct is the ideal considering transparency of the mount.

This long polymerization time is often objectionable, and to obviate such time delay a batch of monomer, sufficient for several months' use, is mixed with the catalyst and placed in an open jar at room temperature, or in a warm place until rather thick and syrupy. Initial polymerization takes from 3 to 10 days depending upon the amount of catalyst used, the temperature of storage, and the degree of thickness desired.

Greater initial thickening shortens the time of making mounts. Too much thickening may be objectionable if the specimen to be mounted is of very intricate shape so that there is a chance of trapping air bubbles at the specimen surface. This is seldom troublesome, since there is normally adequate time for settling out of entrapped air bubbles before solidification takes place.

The jars are capped and kept refrigerated until ready for use. Temperature of storage is not critical nor is capping, i.e. the cap need not be absolutely air tight, but it is best to store the mixture below 32°F. Should it be necessary to store a batch at higher temperatures, a smaller amount should be mixed to avoid complete polymerization of the stock over a long period of time. There is a definite tendency of the styrene to evaporate rather rapidly, which causes concentration of the catalyst and promotes polymerization (hardening).

Actual mounting procedure is simple and straightforward. It was found best to use sections of glass tubing as a mold. Generally, a 1-in. diam mount, about 1 in. high, is desired. Glass tubing (thin wall is preferred) of the desired diameter is cut in lengths about twice as long as the desired mount height. One end must be ground flat and this can be readily accomplished by hand grinding on coarse emery paper or cloth.

A small piece of cellophane is placed on a glass plate and the specimen and glass tube, ground side down, are placed on the cellophane. The cellophane allows the hardened mount to be readily removed and prevents disturbance of other specimens being processed on the glass plate. The thickened polystyrene is poured carefully into the glass tube, allowing for evaporation and dimpling, at the top of the mount. Hardening will take about 36 hr for 5 pct catalyst and about 4 days for 1 pct catalyst.

The glass is carefully broken away from the mount and the specimen is ready for polishing. Dry grinding of the mounted specimens must be avoided. This is an obvious limitation, since the special mounting method was used to prevent heating above room temperature. Any wet polishing technique may be used and most etchants will not effect the mount.

For polishing the very soft metals it is recommended that a clean, sharp medium file (mill bastard) be used in lieu of preliminary grinding. The specimen should be dragged across the file in the cutting direction only and the final cut should be made with the file teeth absolutely free of metal particles. If a microtome is available, soft metals may be microtomed in the mount particularly if the specimen size is small. The microtome cut must be limited to ten microns or less. Since the cutting mass is greater than usual, such microtoming will dull the blade rather rapidly. It is well, therefore, to use a short final polish on a wheel rather than attempt to examine the as-microtomed surface. The polystyrene will become somewhat harder, well after the periods of time mentioned above, so it is advisable to microtome the specimen as soon after preparing the mount as is practicable.

The author is indebted to the Electric Storage Battery Co., Philadelphia, in whose laboratories he developed the method described in this article.

Heat Treatment of Aluminum

IN THE case of aluminum-silicon alloys, the equilibrium diagram in fig. 19 shows that the maximum solid solubility of silicon in aluminum is 1.65 pct at 1071°F, and the minimum 0.01 pct at room temperature. The phase which would be expected to precipitate from a supersaturated solid solution would be silicon.

The effect of silicon upon the tensile properties of aluminum-silicon alloys is shown in fig. 20 for silicon contents up to 14 pct. The heat-treated specimens for which data are shown were solution heat treated at 1050°F for 40 hr. Included are both normal and modified (treated with sodium or potassium) specimens.

Referring to the normal curves, increased amounts of silicon increase the tensile strength and decrease the elongation. Maximum beneficial effect of solution heat treating (over as-cast properties) is obtained by silicon additions of less than 5 pct.

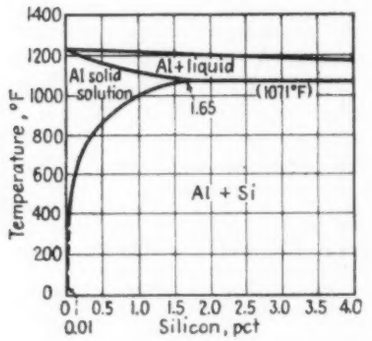
The modified specimens react less to heat treatment than do the normal specimens. The elongation is raised and the tensile strength is lowered. At 5 pct, and at 13.6 pct, the effect of heat treatment is almost nil, but more change is noted for intermediate additions.

The effect of solution heat treating time on the tensile properties and hardness of a 13.5 pct Si alloy and two purities of a 5 pct Si alloy are shown in fig. 21. The purer 5 pct Si alloy reaches maximum tensile strength and hardness in less than 1 hr at 1050°F, while upon longer solution treatment both properties decrease slightly, but elongation continues to increase. The 13.5 pct Si alloy, which has been modified, follows the same trend as the 5 pct alloy.

In the first part of this two-part article, THE IRON AGE, *March 3, p. 88, the authors presented data indicating the influence of heat treatment on the physical properties of aluminum-copper alloys.—Ed.*

Fig. 21 also shows the effect of solution heat treat time on a 5 pct Si alloy having a lower purity than the one previously described. The less pure alloy has a higher hardness and the hardness is more reactive to heat treatment. The tensile strength reacts more slowly than that of the pure alloy, and at longer times the less pure alloy has a slightly higher tensile strength. The elongation is considerably lower for all solution heat treating times.

The explanation of the drop-off in tensile strength and hardness after long-time solution heat treatment lies in the spheroidization of the



ABOVE

FIG. 19—System Al-Si, detail of the aluminum end of the equilibrium diagram, showing the solid solubility of silicon in aluminum.[4]

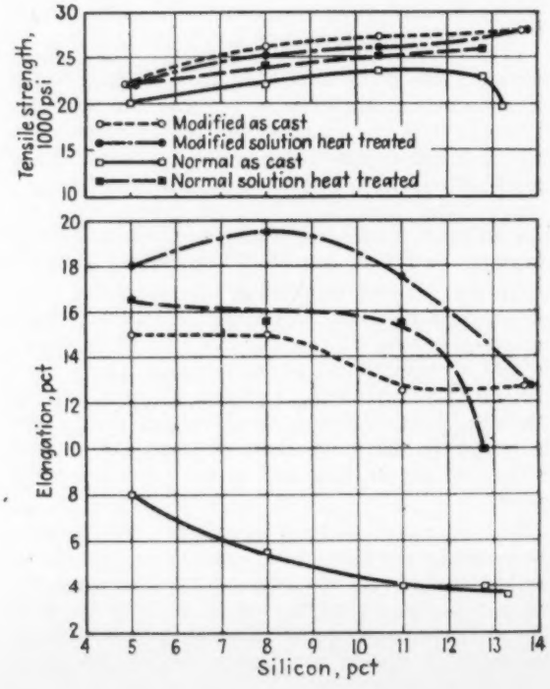


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FIG. 20—Effect of silicon on tensile properties of normal and modified aluminum alloy sand castings. Alloys solution heat treated at 1050°F for 40 hr.[33]

Casting Alloys

By R. E. SPEAR and L. J. EBERT
Research Assistant and Senior Research Associate, respectively, Metals Research Laboratory, Case Institute of Technology, Cleveland

Correlating scattered data from the literature, the authors are able to present a comprehensive view of the characteristics of several major aluminum casting alloys. Data pertaining to the effects of heat treatment, grain size and alloy additions on the physical properties of the aluminum-silicon, aluminum-magnesium and aluminum-silicon-magnesium alloys, are presented in this concluding part of a two-part article. An extensive bibliography and reference listing are also included.

microconstituents. Thus, the solution heat treatment in fig. 21 includes both the effects of solid solution formation at short times and softening caused by spheroidization at longer solution times.

Fig. 22 shows the influence of aging time at 300°F and at room temperature on the tensile properties of 13.5 pct and 5 pct Si alloys. With the exception of the elongation of the 5 pct Si alloy, the effect of aging at both temperatures is almost nil. The elongation is reduced to 80 pct of its unaged value after 4 days at 300°F.

Data presented in table I for the high-silicon aluminum alloy, silumin, in the four conditions; as-cast, stabilized 8 days at 660°F, solution heat treated at 990°F, and solution heat treated at 990°F aged at 300°F for 20 hr, show that little change in properties is produced in most cases. However, a long time anneal does produce a slightly softer and more ductile alloy.

Thus, it may be summarized that the silicon alloys, in the absence of magnesium, generally react only slightly to heat treatment. There is a solution effect for the various silicon alloys, but

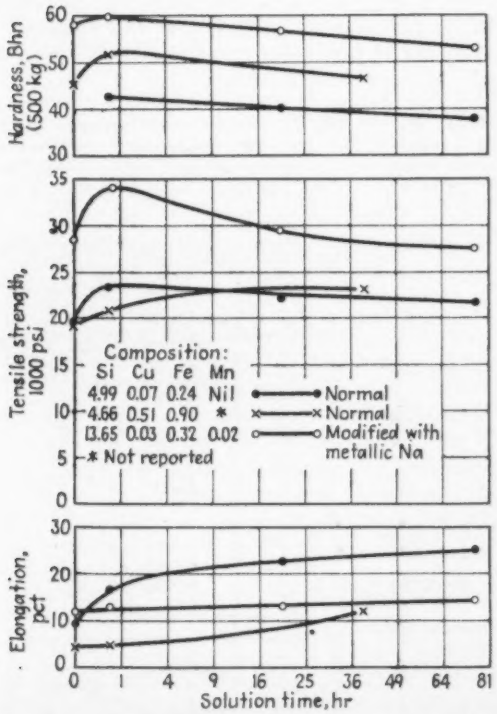

FIG. 21—Effect of solution heat treating time on the properties of various Al-Si sand-cast alloys. Solution temperature 1050°F.[33]

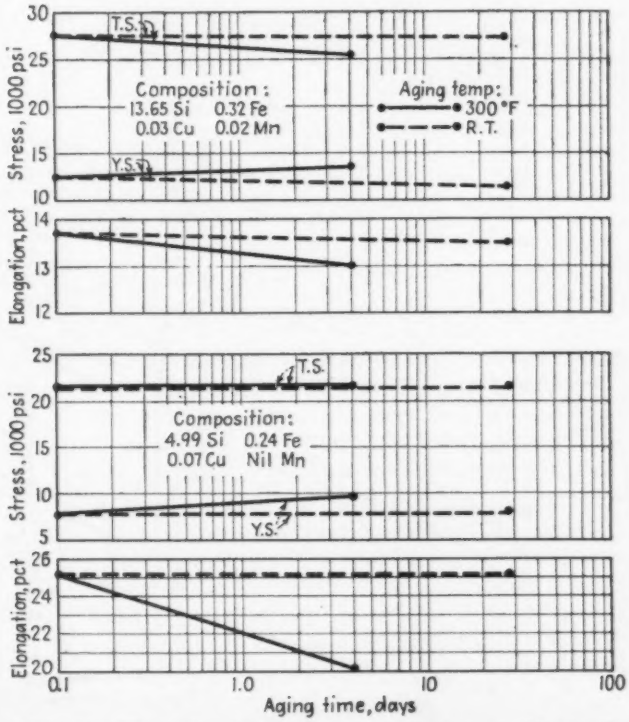

FIG. 22—Effect of aging time and temperature on the tensile properties of two sand-cast Al-Si alloys. Modified alloy (shown in upper set of curves) solution treated at 1050°F for 75 hr; normal alloy (lower set) in sand-cast condition.[33]

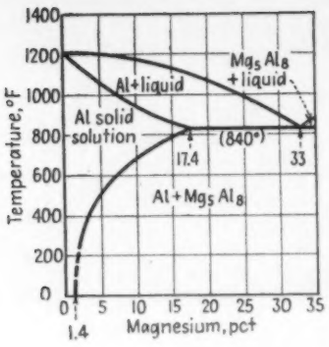

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FIG. 23—Aluminum end of the Al-Mg equilibrium diagram, showing solid solubility of magnesium in aluminum.[4]

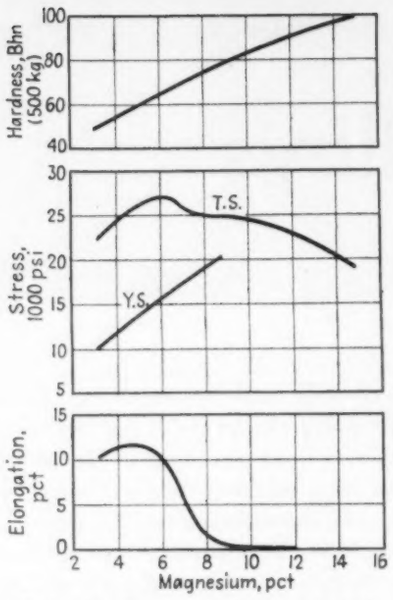

FIG. 24—Tensile properties of high purity, sand-cast Al-Mg alloys in the as-cast condition.[5]

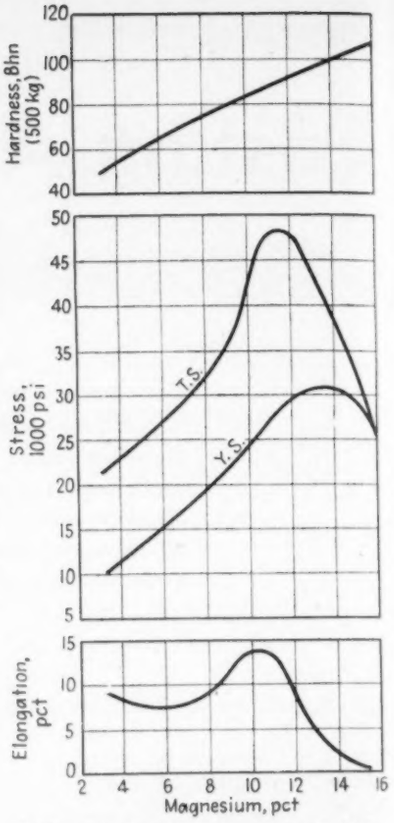

FIG. 25—Tensile properties of high purity, sand-cast Al-Mg alloys in the solution heat treated condition.[5]

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the precipitation hardening is almost negligible. Additions of small amounts of magnesium to the aluminum-silicon alloys does bring about a great change in reactivity to heat treatment. The difference is so great that the aluminum-silicon-magnesium group will later be treated as a separate type of alloy.

Aluminum-Magnesium Alloys

The equilibrium diagram for this system, fig. 23, shows that the solid solubility of magnesium in aluminum varies from 17.4 pct, at 840°F to about 1.4 pct at room temperature. The phase which could be expected to precipitate from a supersaturated solid solution has a nominal composition of Mg_5Al_8.

The effect on the tensile and hardness properties of magnesium additions from 3 to 15 pct are shown in figs. 24 and 25, the former showing the effect of magnesium in the as-cast condition, while the latter shows the same effect in the solution heat treat condition. Solution heat treatment is only slightly effective in the range of 2 to 3 pct Mg but becomes considerably effective at

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FIG. 26—System Al-Mg-Si, quasi-binary section Al-Mg_2Si showing solid solubility of Mg_2Si in aluminum.[4]

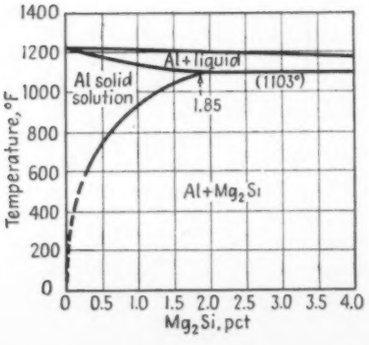


FIG. 27 — Effect of solution heat treating temperature on tensile properties of three chill-cast Al-Si-Mg alloys. Solution time 6 hr; aged at 230°F for 16 hr.[32]

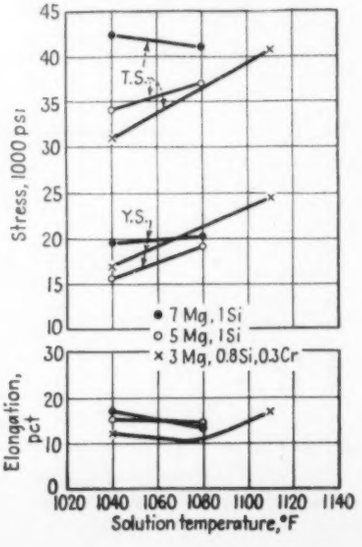
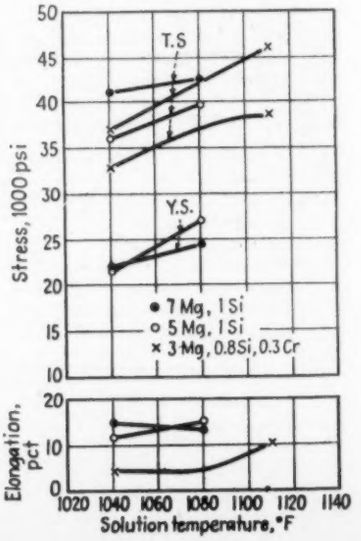


FIG. 28—Effect of solution heat treating temperature on tensile properties of chill-cast Al-Si-Mg alloys. Solution time 6 hr; aged at 340°F for 16 hr.[32]



10 to 12 pct Mg. The tensile strength of alloys containing 10 pct or more Mg may be increased 5 to 10 pct further by precipitation hardening, but at a considerable loss to ductility.[5]

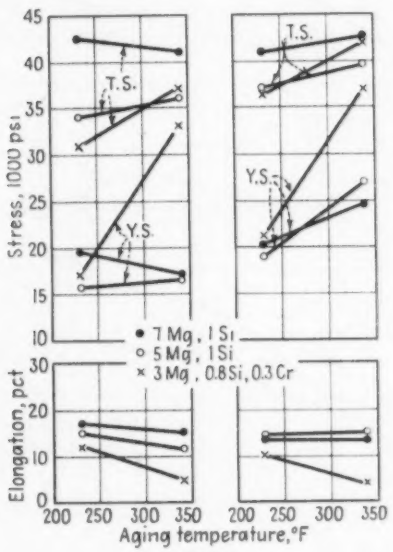
The heat treatment of aluminum-magnesium alloys is greatly changed by the addition of silicon to form Mg_2Si.

Aluminum-Silicon-Magnesium Alloys

Although this group of alloys may be divided into two sub-groups, one containing high magnesium and low silicon and the other containing high silicon and low magnesium, they both rely to a large extent upon the formation of Mg_2Si for hardening.

The equilibrium diagram in fig. 26 shows that the maximum solid solubility of Mg_2Si in aluminum is 1.85 pct at 1103°F. The solubility at room temperature is less than 0.1 pct. The addition of excess silicon does not affect the solid solubility of Mg_2Si, but an excess of magnesium lowers it to such an extent, that at 3 pct excess magnesium the solubility of Mg_2Si is reduced to zero for all temperatures. The exact weight ratio of Mg:Si required for Mg_2Si formation is 1.73.

High-magnesium, low-silicon alloys have been investigated for alloys containing 3, 5 and 7 pct Mg. Figs. 27 and 28 show the change in tensile properties for various solution heat treating temperatures and influenced by magnesium and silicon contents. The highest solution heat treating temperature (1115°F) is slightly above the eutectic temperature of Mg_2Si, but the physical properties seem to be detrimentally affected only as regards yield strength. Both figures show that when a favorable Mg:Si ratio exists, high solution treatments are preferable.



ABOVE

FIG. 29—Effect of aging (16 hr) at various temperatures upon tensile properties of Al-Si-Mg alloys. Alloys, at left, solution treated at 1040°F for 6 hr; alloys, at right, solution treated at 1080°F for 6 hr.[12]

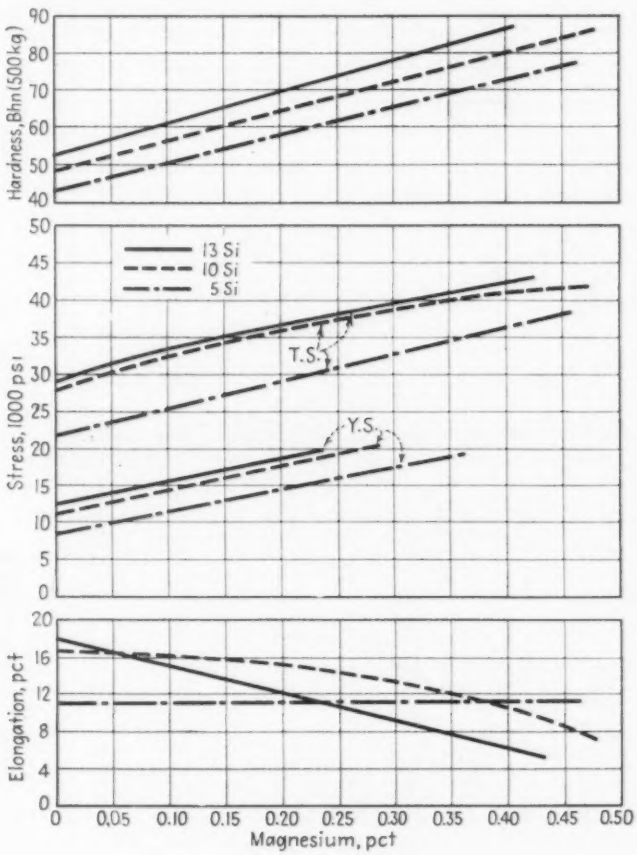


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FIG. 30—Effect of magnesium on the properties of three chill-cast Al-Si alloys. Alloys solution treated at 1025°F for 2 hr; aged 4 days at room temperature.[13]

Fig. 29 shows the effect on the tensile properties of aging temperature from two solution heat treatments. Heat treatment is much more effective for the alloy with the most nearly correct magnesium:silicon ratio.

High-silicon, low-magnesium alloys have been studied by numerous investigators.[9, 13, 14, 15, 16] Practically all of the hardening of this type of alloy is due to the formation of Mg_2Si as can be seen by comparing the following data with that given for the aluminum-silicon alloys. The effect of magnesium on silicon alloys is shown in figs. 30 and 31.

It is interesting to note in the two figures that the curves for tensile strength, yield strength and hardness increase at about the same rate for all

[9] *F. N. Budgen, "The Heat Treatment and Annealing of Aluminum and Its Alloys," Chapman and Hall, Ltd., London,* 1932.

[10] *"Alcoa Aluminum and Its Alloy," Aluminum Co. of America,* 1946.

[11] *R. S. Archer, L. W. Kempf and D. B. Hobbs, "Heat Treatment of Aluminum-Silicon Alloys," AIME, TP* 23, 1927, *p.* 1.

[12] *E. Kroener, "A Contribution to the Question of the Age-Hardening Mg_2Si-containing Aluminum-Magnesium Casting Alloy," Aluminum, vol.* 19, 2, 1937, *p.* 58.

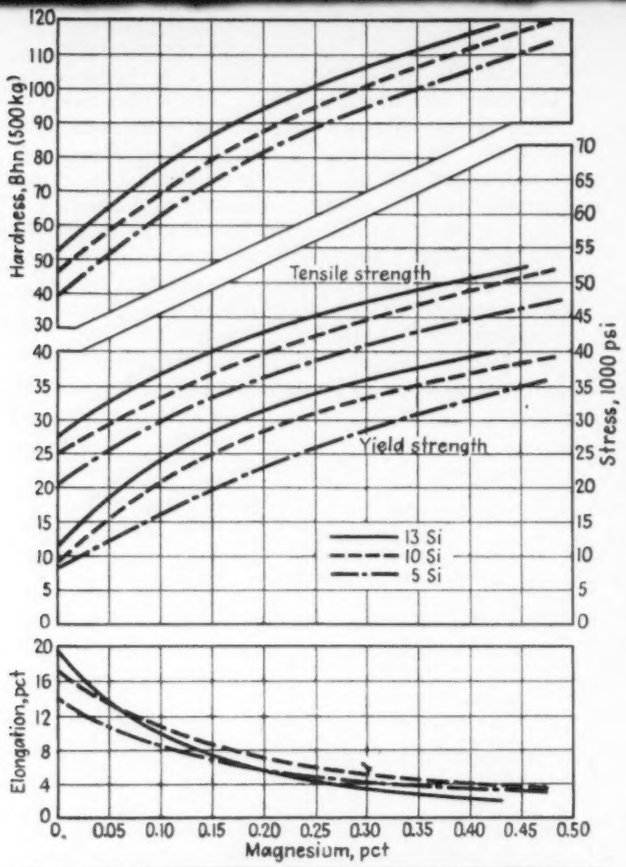
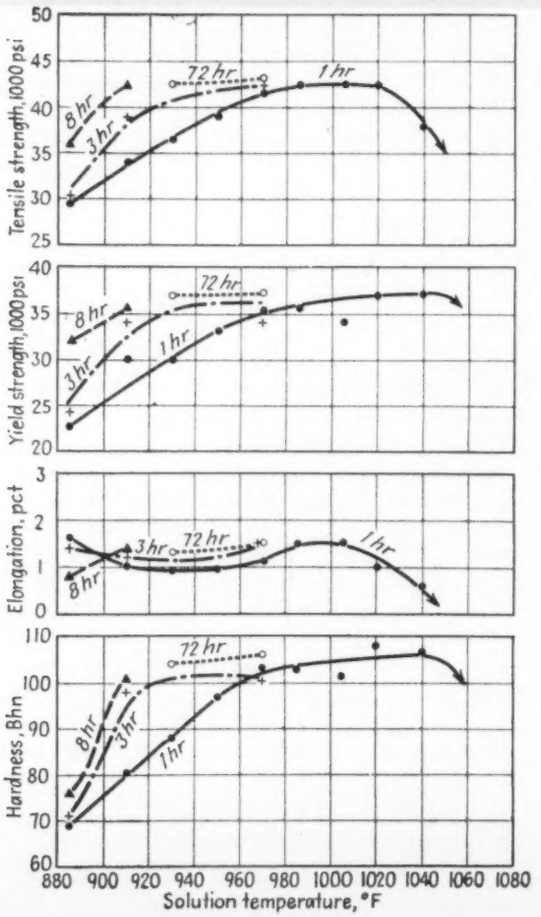


FIG. 31—Effect of magnesium additions on the properties of three chill-cast Al-Si alloys. Solution treated at 1025°F for 2 hr; aged at 310° for 20 hr.[33]

FIG. 32—Effect of solution heat treating temperature and time on the properties of sand-cast silumin gamma.[34]



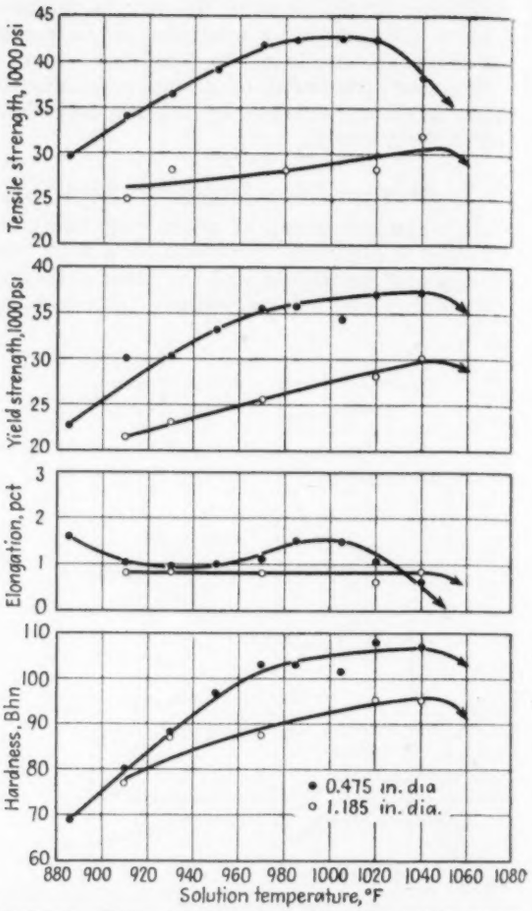
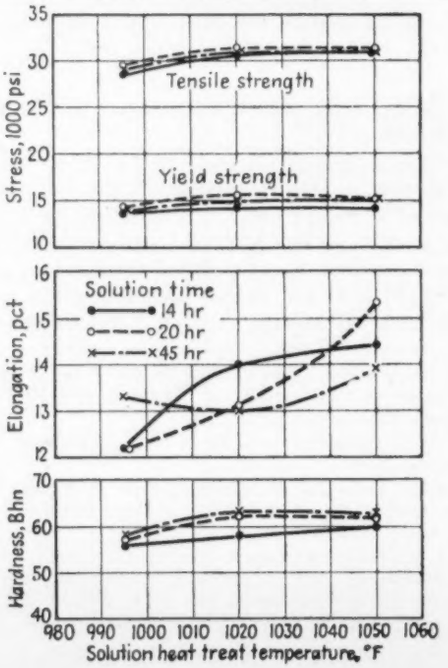


FIG. 33—Effect of casting size and solution heat treating temperature on the properties of silumin gamma. Alloy solution treating time 1 hr.[34]

FIG. 34—Change in properties of a modified (0.05 Na) alloy, containing 0.11 Cu, 0.47 Fe, 0.16 Mg and 9.86 Si, with solution time and temperature. Alloy sand-cast from 1225°F; aged for 2 days at room temperature.[18]



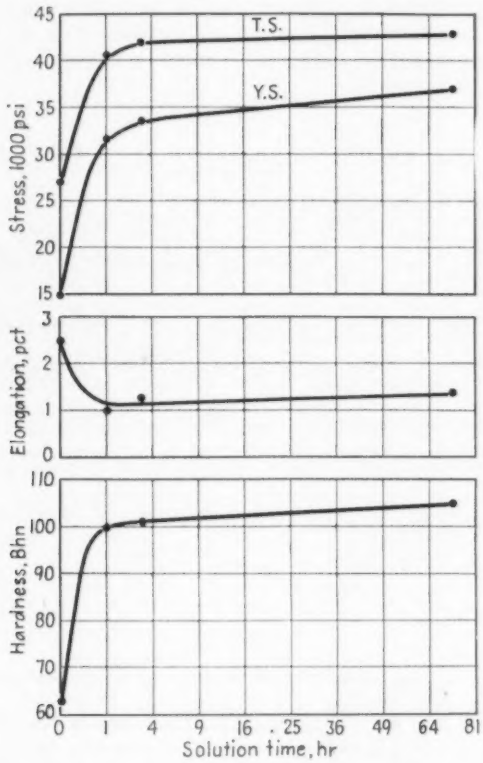
silicon contents and increasing magnesium additions. Thus it is generally true that after solution heat treating, small amounts of magnesium harden aluminum-silicon alloys by amounts directly proportional to the magnesium contents.

[13] *R. S. Archer and L. W. Kempf, "Aluminum-Silicon-Magnesium Casting Alloys," Preprint, Mining & Metallurgy, September* 1930.

[14] *G. Sachs and E. Scheuer, "The Properties of Silumin Gamma Containing Magnesium," Metallwintschaft, vol.* 14, 1935, *p.* 937.

[15] *A. Zeerleder, "The Precipitation-Hardening of Aluminum Castings," Aluminum, vol.* 19, 2, 1937, *p.* 53.

[16] *G. Guerlter, "The Effect of Heat Treatment on Magnesium-free and Magnesium-containing Silumin Castings," Aluminum, vol.* 19, 2, 1937, *p.* 66.

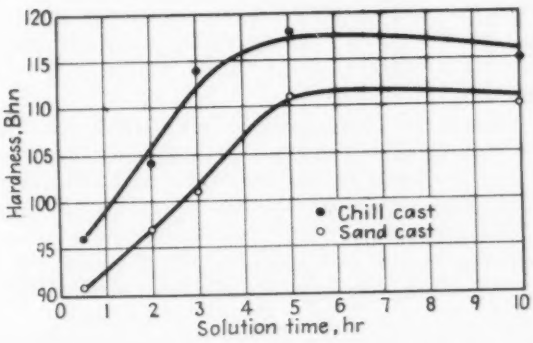


The effect of solution heat treating temperatures for various times is shown in figs. 32 and 33. The data represented in these figures are for the alloy silumin gamma, containing 12 pct Si, 0.4 pct Mg, and 0.5 pct Mn. It will be noted in fig. 32 that longer solution times raise all of the trend curves for any given temperature. The maximum properties in tensile strength, yield strength, and hardness are obtained by heat treating at about 950°F to 970°F for 72 hr.

Fig. 34, plotted from data by Archer and Kempf,[13] shows the solution effect for an alloy containing 10 pct Si and 0.16 pct Mg. According to the figure the solution heat treating temperature and time for this alloy are not critical except in the elongation. The elongation is increased the greatest for a solution heat treat time of 20 hr. All data were obtained from bars aged 2 days at room temperature after solution heat treatment. No complete aging data were presented for this alloy.

A plot from the data in fig. 32 is given in fig. 35 to show the effect of solution heat treating time at 960°F. It will be noted that the first few hours cause considerable change in the properties; longer times continue the change but at a much slower rate. Up to 72 hr there is no sign of a spheroidizing effect.

Fig. 36 shows the effect of grain size on solution heat treatment. The chill-cast specimens react considerably faster to the solution treatment and also attain higher hardness. Fig. 33 also shows the effect of casting size on solution heat treating temperature. Larger diameter specimens require a more severe solution heat



ABOVE

FIG. 36—Effect of grain size on hardness of silumin gamma for various solution heat treating times. Solution treating temperature 990°F.[15]

LEFT

FIG. 35—Effect of solution heat treating time on properties of silumin gamma. Solution temperature 960°F.

treatment. Burning of the alloy occurs at about 1040°F and is accompanied by a sharp decline in properties.

The room temperature aging of two alloys of the aluminum-silicon-magnesium group is shown in figs. 37 through 40. Alloy 355 has a nominal composition of 5.0 pct Si, 0.5 pct Mg, and 1.3 pct Cu, and alloy 356 has a nominal composition of 7.0 pct Si and 0.3 pct Mg[10]. Figs. 37 and 39 show the properties of the sand-cast alloys, while figs. 38 and 40 are associated with permanent mold alloys.

Chill-cast alloys age faster than do the sand-cast alloys, which is in agreement with the theory. In every case practically all of the aging takes place within 10 days after solution heat treatment.

The results of different aging times and temperatures for a 12 pct Si, 0.4 pct Mg alloy are

TABLE I

The Effect of Several Heat Treatments Upon Pure Silumin[16]

Condition	Yield Strength, Psi	Tensile Strength, Psi	Elong., (In 2 in.) Pct	Brinell Hardness, 500 Kg
As Cast	12,800	28,400	8	58
Stabilized 8 days at 600° F	9,200	21,200	9-10	40
Solution heat treated at 990°F	12,800-14,200	29,700	8-9	60
Solution heat treated at at 990° F and aged at 300° F for 20 hr	12,800-14,200	29,700	8-9	60

shown in fig. 41. The curves follow the pattern of the theoretical curves discussed earlier. Full hardness may be achieved by long times at low temperatures or short times at high temperatures. Probably the optimum practical aging conditions derived from fig. 41 would be 4 to 9 hr, at 355° to 340°F.

The above data is plotted in fig. 42 for a time of 9 hr, to show the effect of aging temperature. The importance of maintaining a controlled temperature is obvious from this representation. The tensile strength and yield strength are at optimum values for only about a 10°F range. Especially is the yield strength sensitive to temperature changes.

Although the literature on the heat treating of aluminum casting alloys leaves considerable to be desired, a generalization can be expressed to the effect that all of the alloys discussed react in a similar manner to thermal treatment even though the maximum properties of each are arrived at by variations in heat treating technique. These optimum properties are also seen to be attained only in a small range of times and temperatures for each alloy. For this reason it is obvious that considerable control of the heat treating apparatus is necessary if optimum results are to be obtained. In most cases a variation of only five degrees for both the solution and precipitation heat treatments constitutes good heat treating practice.

A second fact which deserves special notation is the variation in the properties of each alloy (excepting perhaps the silicon alloys) which may be produced by changing the heat treatment. Even with the somewhat limited information contained in this survey it can be seen that the properties of almost any one of the aluminum casting alloys can be changed to meet a host of special requirements.

The authors acknowledge the assistance of George Sachs, formerly director of the Metals Research Laboratory, for his direction in this work, and to the Aluminum Research Institute, Chicago, sponsors of the work, for permission to publish this article.

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P. D. Merica, "The Age Hardening of Metals," AIME, vol. 99, 1932, p. 13.

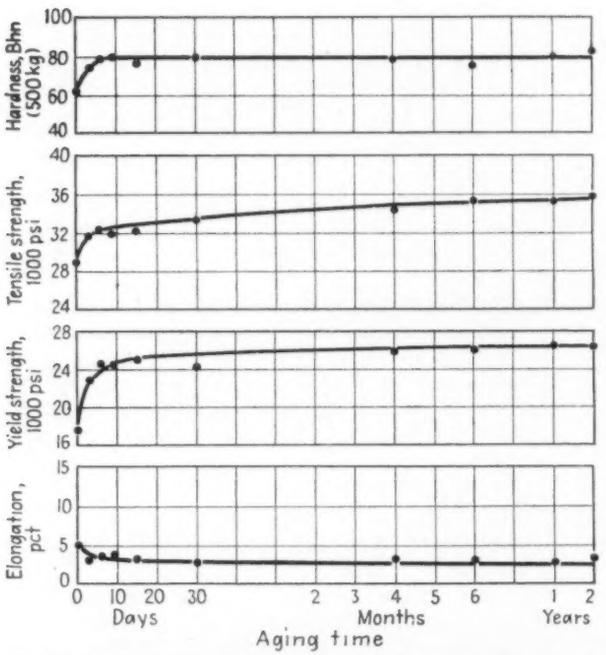


FIG. 37—Effect of room temperature aging on properties of sand-cast alloy 355. Alloy solution treated and aged at room temperature.[1]

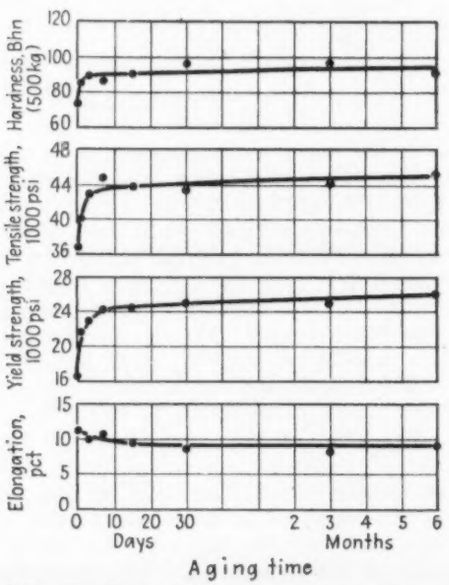
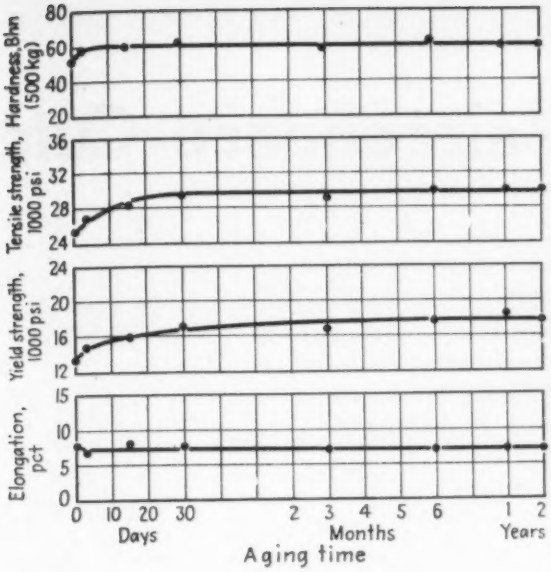
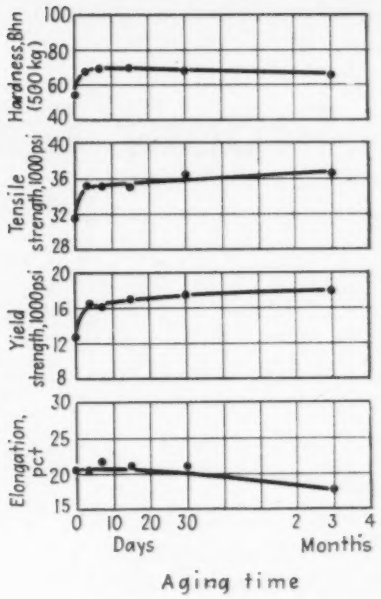


FIG. 38—Effect of room temperature aging on the properties of permanent mold alloy 355. Alloy solution treated and aged at room temperature.[1]



LEFT

FIG. 39—Effect of room temperature aging on the properties of sand-cast alloy 356. Alloy solution treated and aged at room temperature.[1]



RIGHT

FIG. 40—Effect of room temperature aging on the properties of permanent mold alloy 356. Alloy solution treated and aged at room temperature.[1]

W. L. Fink and D. W. Smith, "Age-Hardening of Alloys I—Aluminum-Copper Alloy," AIME, vol. 122, 1936, p. 284.

M. L. V. Gayler, "The Effect of the Addition of Small Percentages of Iron and Silicon to a High-Purity 4 Pct Copper-Aluminum Alloy," J. Inst. Metals, vol. 50, 1, 1937, p. 75.

W. L. Fink and D. W. Smith, "Age-Hardening of Aluminum Alloys II,—Aluminum-Magnesium Alloy," AIME, vol. 124, 1937, p. 162.

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H. H. Richardson, "The Heat Treatment of Aluminum Castings," Light Metals, vol. 1, 1, 1938, p. 10.

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H. Y. Hunsicker, "Precipitation Hardening Characteristics of High Purity Aluminum-Copper and Aluminum-Copper-Iron Alloys," Age-Hardening of Metals, ASM, 1940, p. 56.

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W. Bonsack, "Effect of Alloying Elements on Aluminum Casting Alloys," Trans., AFA, vol. 52, 1944, p. 789.

H. Brown, "Development and Properties of Sand Cast Aluminum Alloys Having High Strength After Aging Without Previous Heat Treatment," Trans., AFA, vol. 52, 1944, p. 1037.

F. A. Allen, "High Silicon Aluminum Alloys,—Their Casting and Heat Treatment," Light Metals, vol. 8, September 1945, p. 431.

E. Carrington, "Heat Treatment of Aluminum Alloys Castings," Light Metals, vol. 9, July 1946, p. 336.

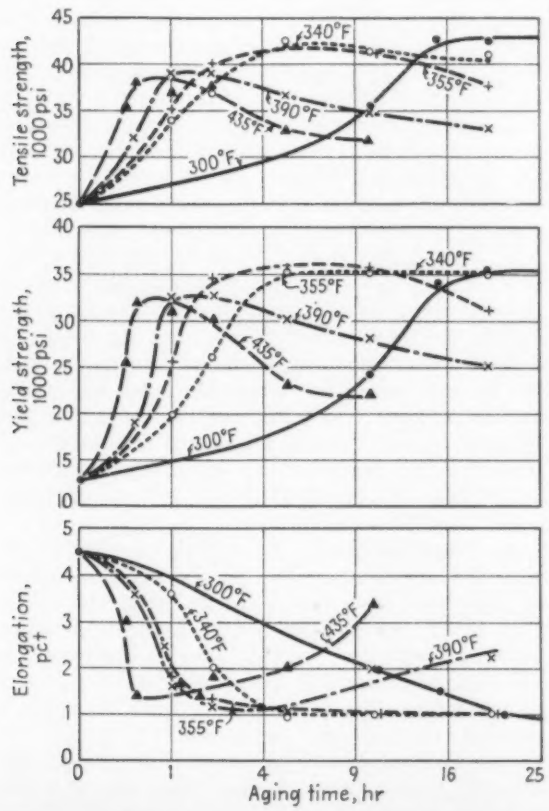


FIG. 41—Effect of aging time and temperature on the tensile properties of sand-cast silumin gamma.[34]

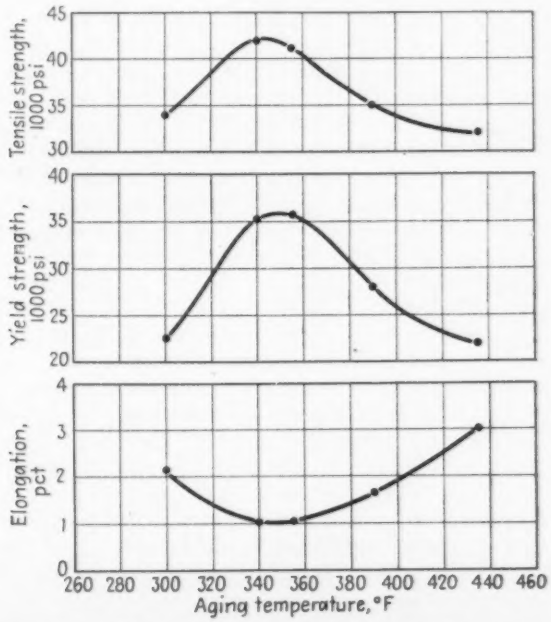


FIG. 42—Effect of aging temperature on tensile properties of sand-cast silumin gamma. Aging time 1 hr.

Proper Battery Maintenance Cuts

By K. A. VAUGHAN
Mgr. of Field Engineering,
Gould Storage Battery Corp.,
Trenton, N. J.

WITH every year added to the life of batteries used in electric fork trucks and other battery powered material handling equipment, the overall costs of the equipment powered by those batteries is reduced 5 to 10 pct. Battery maintenance procedures and equipment are relatively simple, but, through neglect and lack of appreciation of the value of better battery care, industry is not realizing its full opportunity for longer storage battery life. In battery operated equipment, the battery requires a minimum of maintenance if that maintenance is properly supervised.

The main causes of battery failure are improper charging and failure to repair damaged cells. Improper charging or failure to give the battery sufficient charge after each discharge reduces the duty cycle and increases the time required to bring an overdischarged battery to full charged condition. This disrupts the entire battery charge system.

Failure to repair damaged cells reduces the efficiency of the battery by reducing the total voltage, resulting in a loss of speed and power. The drain on cells in good condition is increased. Damaged cells removed from the circuit increase the finish rate of the battery on charge and tend to damage the positive plate of good cells. Damaged or removed cells lower the voltage of the entire battery, which is harmful to the motor of the truck under load. Failure to periodically wash batteries allows external short circuits to build up across the top of the battery, reducing its efficiency.

Various methods are used to control battery maintenance; one of the best is the daily battery record system. Each battery is numbered, and, as each battery is installed in the truck, the specific gravity and temperature is read and recorded, the time the battery is put into service and the truck to which it is assigned is recorded. When a battery is returned to its charging station the specific gravity and temperature is read and recorded, time is recorded, and the setting of the ampere-hr meter together with a note as to whether evaporation was replaced or not is also recorded. These data are incorporated in the accompanying chart.

A quick glance at a chart of this type can tell the supervisor whether or not the battery receives sufficient charge before being placed into service; the number of hours the battery was in service; if the battery was discharged below normal value; and, by comparing the specific gravity as read at the end of the discharge compared with the ampere meter setting and the ampere-hr meter chart, it is easily determined whether or not batteries are being properly charged.

From a chart of this type a definite procedure can be established as to when batteries should be changed to prevent overworking them. By preventing overworking the battery the efficiency of the truck is increased and there is no lost time from battery failure during the duty cycle. This chart also tells whether a battery was in full charge condition before it was placed in service, as failure to give a battery sufficient charge will also result in battery failure during the shift.

The temperature reading of the battery before being placed in service will be an indication to you whether the proper charge rates are being maintained, because a battery with high temperature is an indication that the charge rates are too high. Investigation may prove that the reason for high charge rates is that cells have been cut out of the circuit, or that leaking or broken jars have caused the battery to become short circuited.

A few users have what might be called a floating battery man who checks batteries while they are in service. From his experience he can tell when a battery should be returned to a charge station. This is rather an expensive technique, but it gives an excellent opportunity to check up on charging conditions.

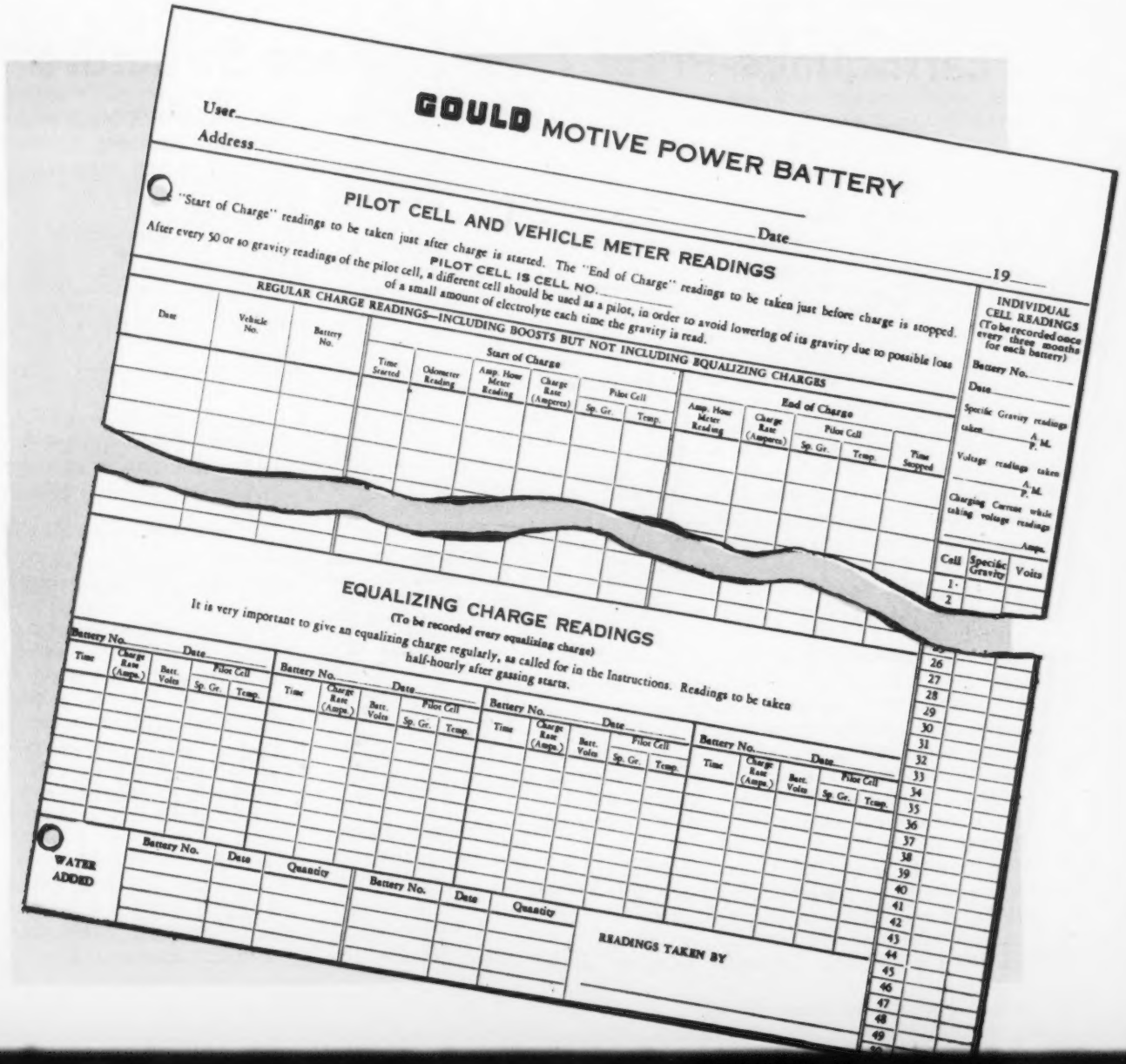
As regards storage batteries, the preventive maintenance must be started the day the battery is unpacked. Everyone concerned with the operation of the battery should be made thoroughly familiar with the manufacturer's maintenance recommendations and these should be followed to the letter. The battery companies maintain a service organization that is available at no cost to instruct personnel to follow out the battery manufacturer's instructions. These men will also instruct personnel in how to repair equipment damaged in service. However, they cannot be

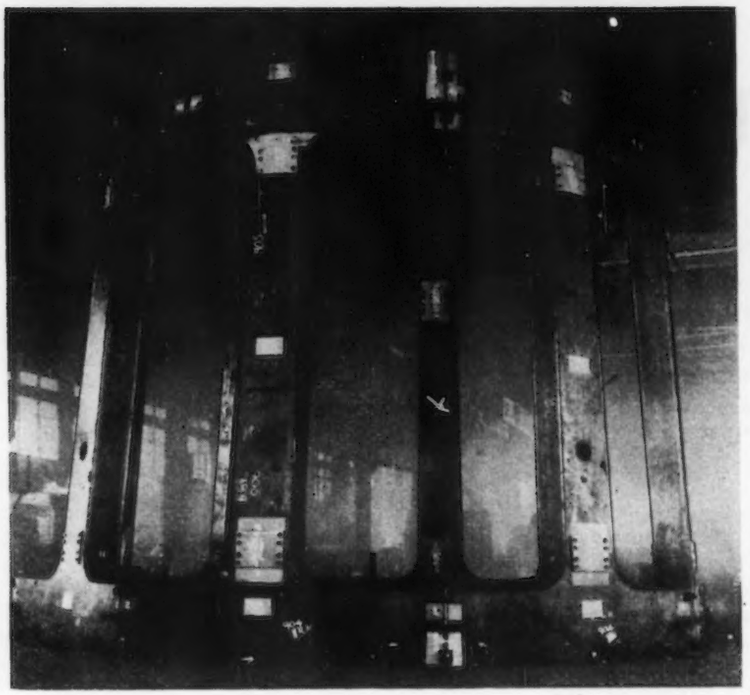
Industrial Truck Operating Costs

Effective battery maintenance can reduce the overall costs of battery-powered industrial trucks by 5 to 10 pct, according to the author. In this article he outlines proven procedures for obtaining the highest efficiency from battery-powered material handling equipment.

available to make all repairs, so it is advantageous to assign a responsible person to the battery engineer at the time he visits a plant so that someone with authority understands what must be done.

Too often this battery engineer is assigned to someone who may be thoroughly familiar with the operations, but has no interest in the life or performance of the equipment as far as maintenance is concerned. Responsibility without authority is of little or no value in the maintenance department.





VIEW of the all-welded mantel support taken in the William B. Pollack Co. shop where it was built.

Earthquake-Proof Blast Furnace Structure

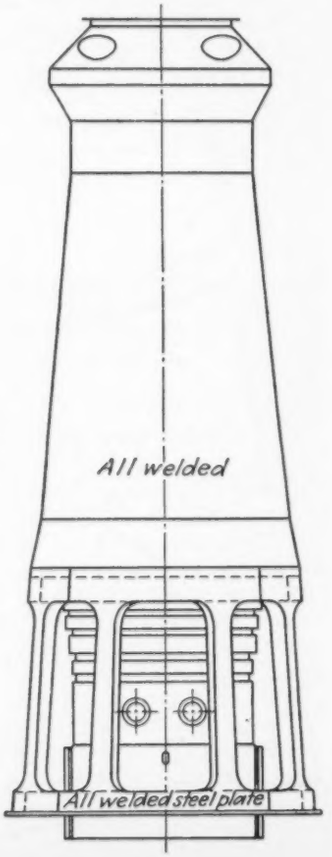
AN earthquake-proof all-welded blast furnace mantel support, shown in the accompanying illustration, has been developed by H. A. Brassert & Co., New York, for the steel plant of the Compania de Acero del Pacifico at the Bay of Vincente, in Chile, a location subject to severe earthquakes.

The design, according to H. A. Brassert & Co., is a radical departure from the usual American practice. The base, columns and mantel are of rectangular, hollow box-girder sections fabricated by welding from 1¼ in. steel plates. The design is calculated to give maximum stiffness to the whole structure so that it will adequately resist the bending, twisting and buckling forces likely to accompany an earthquake. The junctions of the base and mantel with the columns are flared out so as to transmit forces between adjoining parts without any excessive local concentration of stresses. The base, columns and mantel after being welded together form a rigid monolithic structure.

In addition to being earthquake-proof, the new design is said to be considerably cheaper to fabricate and erect, containing less than half as much steel. For the 680 metric ton furnace designed for Chile, the weight of the furnace compares with one of conventional design as follows: Conventional design weight, 528,000 lb; New design weight, 242,000, a saving of 286,000 lb.

For a 12 tuyere, 20 ft hearth furnace, the conventional design calls for 12 columns while the new welded box girder design permits the use of only 8 spaced alternately 40° and 50° apart. This affords increased working space around the hearth and results in a much more desirable and practicable arrangement, since it eliminates the necessity of having tuyeres directly above the iron and cinder notches.

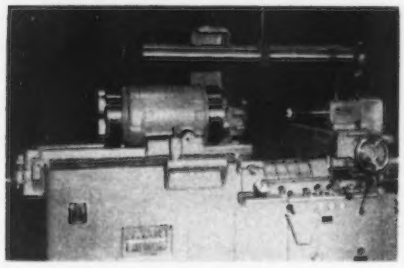
SKETCH of the earthquake-proof blast furnace for Chile, showing the all-welded mantel support.



New Production Ideas . . .

New and improved machines for internal grinding, drilling and tapping, and lock forming, a spot welder and a welder-timer assembly, steel squaring shears, a contour measuring machine, hot vapor degreasers, magnetic separators and pulleys, mill pulpits, strainer cores, a steel plate clamp, an aluminum welding alloy, and a metal stripper are described this week.

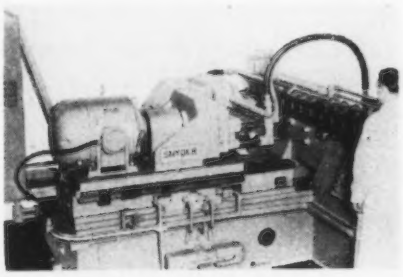
FOR grinding special internal tapers on parts such as machine tool spindles and special axles, an internal grinder, the No. 112-M, features a workhead that can be moved longitudinally to position the work for grinding. A sine bar attachment provides accurate taper control. ID, OD, and face can be ground at one chucking. An attachment allows 180° indexing of the workpiece so that concentricity is assured when both ends of the piece are to be finished. The workhead base is swivel type, providing



for grinding a maximum angle of 30°. *Bryant Chucking Grinder Co. For more information, check No. 1 on the attached postcard.*

Drilling-Tapping Machine

A DRILLING, counter-sinking and tapping machine reduces the work cycle to 16 sec on processing automotive upper control arm assemblies and cuts floor space 25 pct of former requirements. It has one loading and two work stations. When four parts are loaded into the guide rails against the rest plate, the automatic work cycle starts and parts automatically shuttle into the drilling station. A 16-spindle drill head is equipped with heat treated alloy spindles mounted in ball bearings and with standard, adjustable drill adaptors. High speed steel drills are used. Stroke is 10 in.; feed, 0.0009 in. per rev.; and speed, 60 sfpm. When the drilling and countersinking cycle is completed, parts automatically shuttle to the



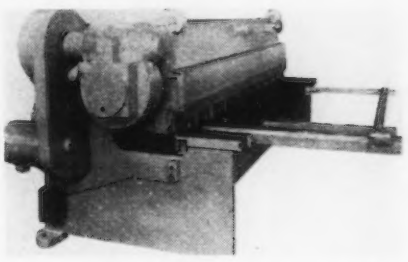
tapping station. The tapping unit is a 16-spindle, individual lead screw type tapping head. Tapping speed is 40 sfpm. The drilling head is powered by a 20 hp motor and the tapping head by a 10 hp motor. *Snyder Tool & Engineering Co. For more information, check No. 2 on the attached postcard.*

General Purpose Electric Drill

A NEW, compact, lightweight, general purpose drill features an offset chuck spindle that permits the operator to drill in close quarters without removing pipe or spade handles of the drill. The drill has ½ in. capacity. Other features include alloy steel gears, thrust ball bearings on spindle, aluminum alloy housing, automatic release safety switch with locking device and Jacobs three-jaw chuck. A bench stand is available for mounting the drill to make a convenient drill press. *Stanley Electric Tools. For more information, check No. 3 on the attached postcard.*

Steel Squaring Shears

SPEED and accuracy of gage setting and shearing have been developed in a new series of steel squaring shears. Ease of operation is effected by a motor-operated precision back gage, solenoid-operated clutch controlled by a movable foot switch, and low overall height. Super-rigid welded rolled-steel construction affords greater strength with reduced weight. A standard feature of the shears is a new worm-gear drive, quiet and free from vibration. The shaft and worm are machined in one piece from chrome-nickel steel, and the worm gear is special aluminum bronze with a tensile strength of 60,000 psi. Automatic hydraulic hold-downs, controlled by a cam to insure positive



operation, grip the work firmly before the blade begins to cut. Shears are available in seven sizes for shearing ⅜ to 1¼ in. mild steel in 6 and 10-ft lengths. *Columbia Machinery & Engineering Corp. For more information, check No. 4 on the attached postcard.*

Lock Forming Machine

LOCK forming jobs in sheet metal shops can be done on a new space-saving machine that features four sets of lock forming rolls. Six-stage lock forming units form in a single pass a Pittsburgh lock, a double seam, a flat S cleat, or a drive cleat. Roll stands are progressively geared so that the last roll turns faster than the first or starting roll. The locks are formed smoothly and without crimping. The Pittsburgh lock can be made in 20 to 26 gage metal, using approxi-

mately 1-in. of material. Flat S cleats can be formed as short as 9 in. in 22 to 26 gage metal using 3¼ in. of material and drive cleats can be made as short as 4½ in. in 20 to 26 gage stock, using 2⅛ in. of material. Double seams are made in 20 to 26 gage, a ⅜ in. seam requiring about 1 in. of material. Uniform lock is provided; and no resquaring of sheet is necessary. The unit is powered by a 110/220 v, ¾ hp motor, with V-belt drive. *Roy G. Flagler Mfg. Co. For more information, check No. 5 on the attached postcard.*

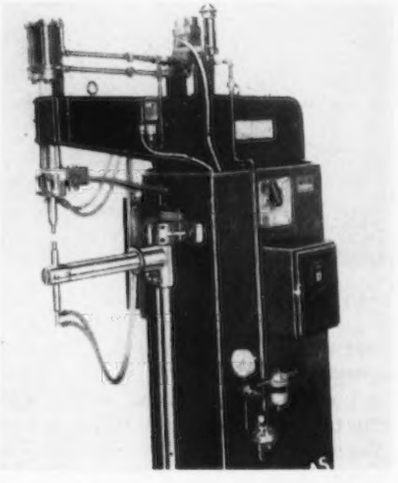
Welder-Timer Assembly

FOR Heliarc spot welding, the new Miller Model 264-T welder-timer assembly consists of the Model 271-A pneumatic timer with solenoid gas valve and flow meter assembled to the Model 264 ac arc welder. This complete package requires only connection to input power, Argon gas, water lines and the Heliarc torch. The arc welder features continuous current control, with adjustment to the fraction of an ampere by rotating the control crank on top of the machine. The high frequency unit and an extra heavy primary contactor with 110

v operating coil are built in. The welder is provided with 220/440 v primary connections. The pneumatic timer is said to have the accuracy of electronics, is extremely simple and requires practically no service. The time in cycles to be used is selected by adjusting a control. The time in cycles in use is shown by an indicator disk, geared to the adjustment control. *Miller Electric Mfg. Co. For more information, check No. 6 on the attached postcard.*

Spot Welder

AN IMPROVED, press type, spot welder operated by a double acting air cylinder has a new solenoid-actuated four-way air-valve that controls the air supply to both sides of the air cylinder. The air system also includes an air pressure regulator with indicating pressure gage, an automatic lubricator and an air filter. Electrode pressure is adjustable. Heat adjustment is made by a heat regulator with dial control. High speed magnetic contactor and weld timer control insure uniformly clean, strong welds. An electric foot switch initiates and governs the automatic function of the welding machine. Electrode holders are adjustable up to 24 in.



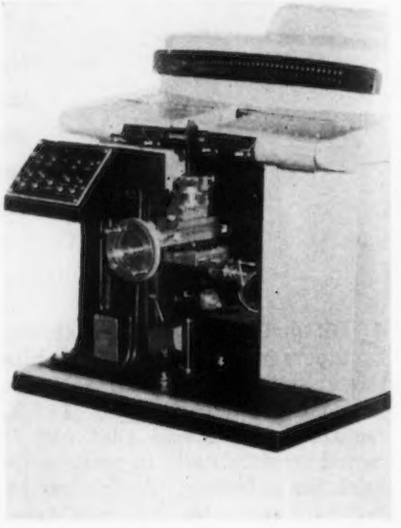
opening between arms. Repeating strokes are possible up to 120 per min. *Eisler Engineering Co., Inc. For more information, check No. 7 on the attached postcard.*

Precision Indexer

DESIGNED for precision indexing, the new True Square has all faces at precisely 90° to adjacent sides, with optical flatness and parallelism. Said to be accurate to millionth parts of a circle, it may be combined with Webber angle gage blocks to index any desired combination of angles with speed and accuracy. *Webber Gage Co. For more information, check No. 8 on the attached postcard.*

Contour Measuring Machine

A NEW machine, the Vizo-Graf, provides a permanent dimensional record of almost any contour to an accuracy of 0.00025 in. and the contour dimension of any station may be read instantaneously to the same accuracy on a visual scale. Contour and dimension are magnified by an optical lever system and permanently recorded on photo-



graphically sensitive paper. The measuring machine, except for set-up, is entirely mechanical. The Vizo-Graf will handle gears, bearings, cams, plug gages, turbine and compressor blades, dies, optical lenses and jigs, tools and fixtures, simply by changing the probe styli and jig. Specially designed styli for each application are available. The machine is rated at 400 turbine blades inspected in an 8-hr day. *Measuring Machines, Inc. For more information, check No. 9 on the attached postcard.*

Wire Stripper

A POCKET size wire stripper called the Stripmaster features an automatic cam action that releases the jaws. Squeezing the handles grips the wire, cuts the insulation and strips the wire, all in one operation. As the handles are released the grippers automatically free the wire and the jaws return ready for the next cut. Four models handle wire gages from No. 22 to 8. *Ideal Industries, Inc. For more information, check No. 10 on the attached postcard.*

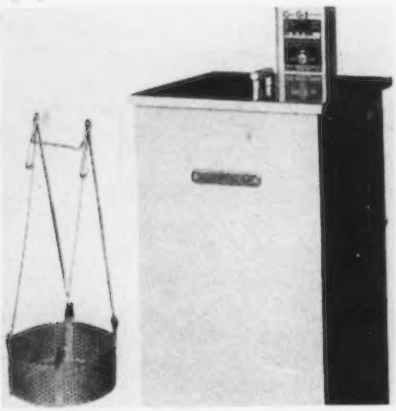
Keyway Broaches and Bushings

AN IMPROVED Minute Man production type keyway push broach for use with either hydraulic or hand operated arbor press supports itself in the hole so that no guide is necessary. Only one pass is required to complete the standard depth of cut. Each broach is

ground to fit its specific hole diameter. The broach is available in keyway widths from 1/32 to ¼ in. and for any desired hole diameter. Collared bushings in sizes from ¼ to 1 9/16 in. simplify locating the broach in the bushing and it is unnecessary to locate the base of the bushing on the arbor press plate. *Du Mont Corp. For more information, check No.* 11 *on the attached postcard.*

Hot Vapor Degreasers

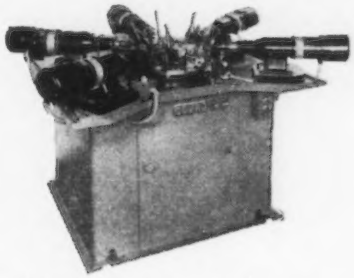
CLEANING and drying any metal before and after intermediate processing in industries where plating, painting or buffing is done is facilitated by automatically controlled hot vapor degreasers that require no attention during the operation. The solvent is heated, creating clean, hot solvent vapor that penetrates greases and oils, condenses on the colder metal and



continues to wash away soil until the parts are completely degreased. The smallest degreaser, the Cub, illustrated, requires approximately 18x23 in. of floor space and stands 42½ in. high. It is electrically operated, and automatically controlled. Circo-Solv solvent used in the Cub will degrease any and all metals and will not burn or explode. It vaporizes at an unusually low temperature. *Circo Products Co. For more information, check No.* 12 *on the attached postcard.*

Special Drilling Machines

SPECIAL machines incorporating drilling and tapping units for the performance of several operations at once are now being built. The machine illustrated has been designed to drill, chamfer, tap-drill and tap the hole for the adjusting worm of a wrench in 5 sec per wrench. The four operations are performed simultaneously with a setup employing a Govro-Nelson six-station indexing dial, interlocked electrically with the units. By dividing the tap-drilling operation into two stations, the total drilling time is cut in half and the



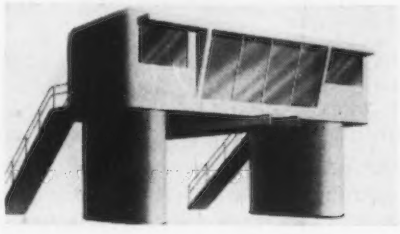
problem of chip elimination is greatly reduced. *Govro-Nelson Co. For more information, check No.* 13 *on the attached postcard.*

Heavy Duty Soldering Iron

EXTRA heavy soldering is possible with a new electric soldering iron that is powered at 700 w, and has a replaceable 1¾ in. diam screw type tip. The iron operates on any cycle, ac or dc, and is furnished for either 110 or 220 v. The heating element is housed in a damage-proof, hexagon-shaped housing. The iron can be held in a vise when replacing or filing tip without danger of denting the housing or damaging the element. The high-heat alloy element core resists scale and prolongs the life of the element. Cooling fins deflect the heat away from the handle. *Hexacon Electric Co. For more information, check No.* 14 *on the attached postcard.*

Mill Pulpits

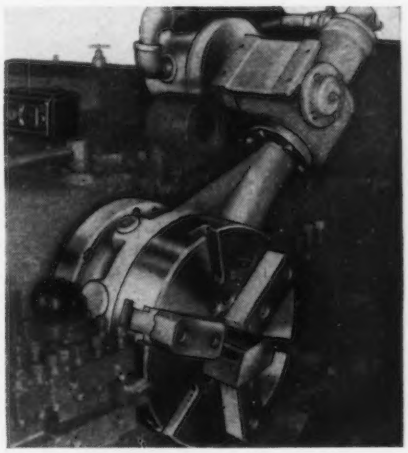
MODERN, streamlined mill pulpits have been designed to give greater efficiency in mill operation for rolling mills, blast



furnaces, and wherever single-point process control is required. The heavy steel paneled walls are insulated to resist heat. The column shrouds conceal all wiring yet it is readily accessible through doors and openings. All corners, both inside and outside, are rounded. The windows at the front are pitched for best possible operating view and thick, shock-resisting glass protects the operators against flying scale and other objects. Other features include acoustical ceilings, non-slip floors, indirect lighting, and air conditioning. *Lee Wilson Construction Co., Inc. For more information, check No.* 15 *on the attached postcard.*

Heavy Duty Power Chuck

COMBINING features of air operated and power wrench operated chucks, the Air-O-Torque chuck has a center hole and allows feeding stock through the center of the chuck. Its housing is attached directly to the lathe head. The lathe spindle extends through the housing and is attached to the chuck. The housing remains stationary while the chuck is free to move



with the spindle. Operation is similar to regular gear scroll chucks with an air motor driving the pinion which engages the scroll causing jaws to close or open. Upon stopping the machine the scroll can be engaged by the pinion in the Air-O-Torque chuck, regardless of the chuck's position on the spindle, and jaw action started, eliminating the necessity of turning chuck to the desired position. Power is supplied by an air operated motor. *Whiton Machine Co. For more information, check No.* 16 *on the attached postcard.*

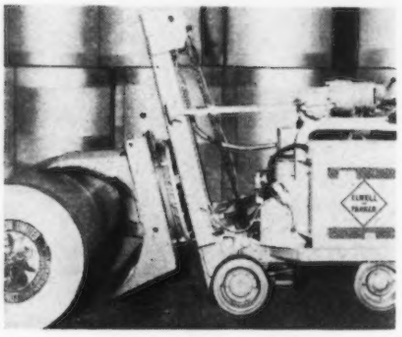
Lubricant

LUBEWAY, a new dual-purpose oil, has been introduced for use in hydraulically operated machine tools that pressure-feed way lubricant from the hydraulic system. Lubeway is said to have the stability and non-sludging characteristics of a good hydraulic oil, and to possess the metal-wetting

and extreme-pressure qualities of a good way lubricant. The lubricant does not form gummy deposits in the pumps, lines, valves or controls; and it protects ways and slides, assuring their smooth operation. It is available in two viscosities, Lubeway 150 and 300. *Sun Oil Co. For more information, check No.* 17 *on the attached postcard.*

Roll-Handling Truck Attachment

TWO steel arms of semi-circular contour that close on a heavy roll of paper or other materials in roll form including casks and drums, hold it securely while it is being picked up, transported, stacked or changed from vertical to horizontal position are the features of a new power truck attachment. The unit is bolted to the rotary mechanism in place of a cradle. It is small, giving the driver greater visibility; light, adding to truck's load capacity; and it holds a roll in a positive



grip. Hydraulic clamping action of the two arms is controlled by the truck's operator. Close, orderly stacking either vertically or horizontally, without pallets, and quick pickup from stacks is accomplished with the attachment. *Elwell-Parker Electric Co. For more information, check No.* 18 *on the attached postcard.*

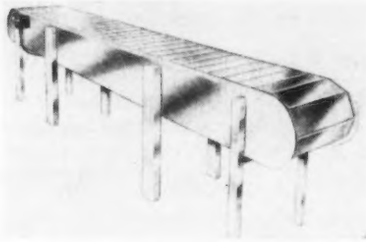
Magnetic Separators

RECOVERY of scrap and sand cleaning are facilitated with a portable, lightweight inclined belt type magnetic separator developed to meet these foundry requirements. An Alnico Perma-Pulley is used as head drive pulley for the inclined belt, automatically effecting a sharp separation of magnetic and non-magnetic material at the discharge end of the conveyer. The separator is completely portable and is provided with motor drive for belt conveyer. The magnetic pulley is weatherproof and magnetic permanence is guaranteed for the life of the separator by the manufacturer. Cost of operation and maintenance is restricted to bearing and motor lubrication. The lower end of the conveyer rests on the ground on a steel skid at a shoveling height of

24 in. Standard separators are available 7 or 10 ft long, with belts 12, 14, 16, 18, 20 or 24 in. Capacities range from 40 to 80 tons of sand per day. *Dings Magnetic Separator Co. For more information, check No.* 19 *on the attached postcard.*

All-Aluminum Conveyer

FOR moving parts and assembled goods from assembly lines to shipping points or storage space, a prefabricated aluminum conveyer has a sagless and vibrationless belt-plate top that conveys at variable speeds up to 100 fpm in either direction. This belt is fastened to a link-chain arrangement that is hooked up with the drive sprockets imparting a smooth and vibrationless drive. Each foot of belt is supported by eight or more rollers, and conveyers 18 in. and wider



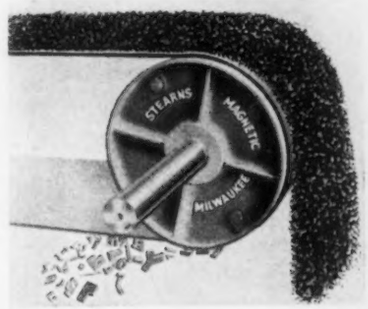
have an added center channel support for greater load capacity. Belts are available in widths from 6 to 96 in. and in lengths up to 175 ft. All-aluminum conveyers are prefabricated in 5-ft sections for quick and easy assembly in the matter of minutes. *Mercury Conveyors, Inc. For more information, check No.* 20 *on the attached postcard.*

Rectifier Power Supply

A PORTABLE rectifier power supply unit designed to provide a mobile, flexible source of testing power for 12 and 24 v, dc motors and controls, operates directly from the line at usual line voltages. It is suitable for laboratory or production testing. Featuring accurate control of filtered, regulated power, PEC 272 is said to maintain dc voltage at ± 1 v of preset value and to hold ac rms ripple under 0.15 v. To withstand the starting in-rush of current required by dc motors, solenoids, and other control apparatus, the unit is equipped with selenium rectifiers capable of delivering 50 amp continuously and up to 200 amp during periods of momentary overload. Full power is instantaneously available at all times. *Power Equipment Co. For more information check No.* 21 *on the attached postcard.*

Permanent Magnetic Pulley

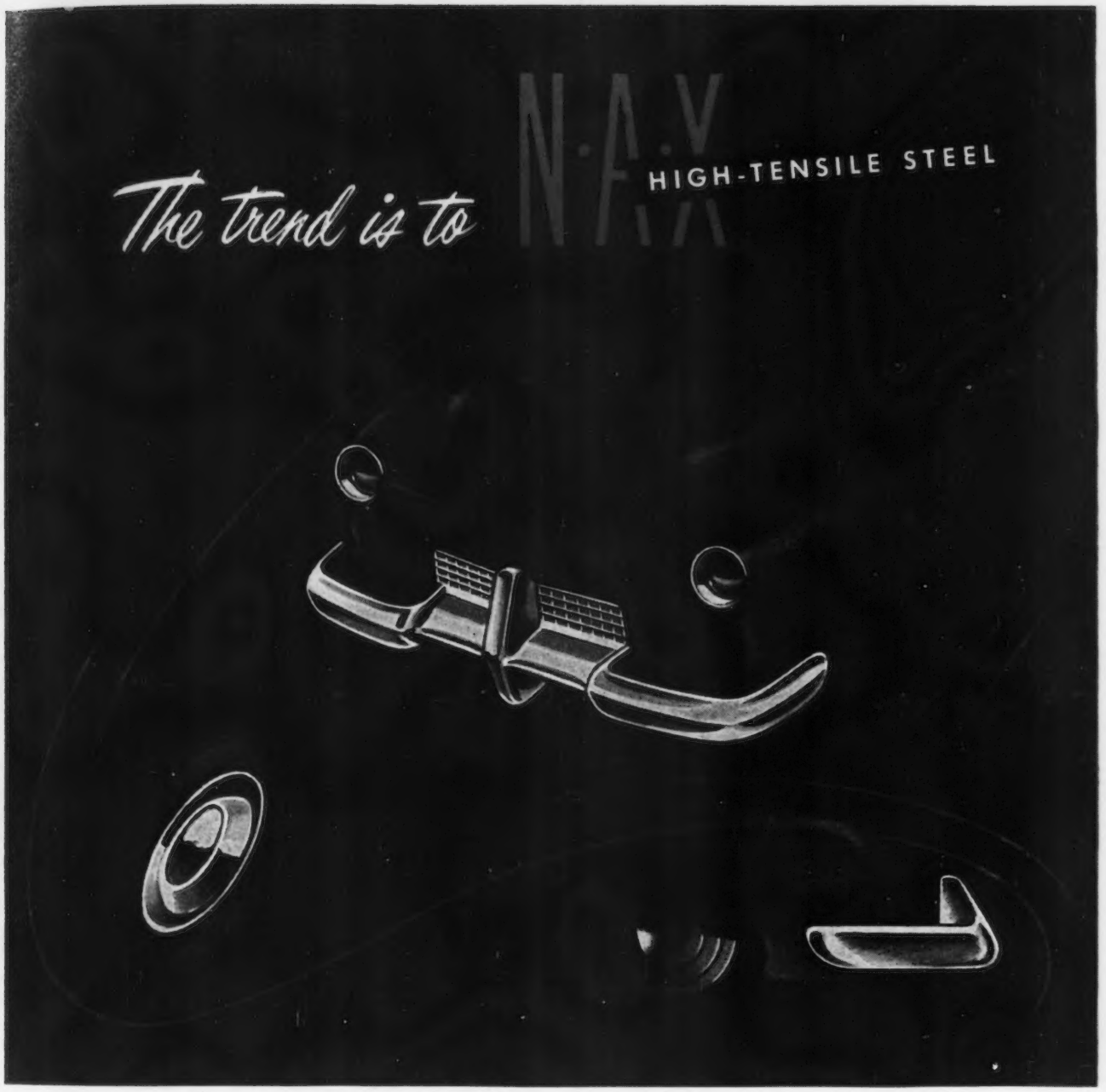
AUTOMATIC removal of tramp iron from raw or processed materials, separation of magnetic



and non-magnetic products, reclaiming secondary metals and protection of machinery, grinders, pulverizers or similar equipment are possible with a new permanent magnetic pulley that incorporates a special design of Alnico metal poles, self-energized and requiring no electrical current. It is designed for uniform high magnetic strength over the entire face of the pulley and can be operated under all atmospheric and temperature conditions. Sizes are available from 12 in. diam x 12 in. wide to 30 x 60 in. *Stearns Magnetic Mfg. Co. For more information, check No.* 22 *on the attached postcard.*

No-Bounce Hammer

A NO-BOUNCE hammer that will not rebound from solid or flexible work features a patented head loaded with angular steel grit, that absorbs the rebound giving a deadweight blow. It can be accurately controlled to avoid marring finished work and avoids the risk of



Since 1940, when Great Lakes Steel pioneered the application of high-tensile, low-alloy steel to cold-stamped automobile bumpers, there has been a growing trend to N-A-X HIGH-TENSILE steel in the automobile industry.

Today, every car manufacturer is using the inherent better properties of N-A-X HIGH-TENSILE steel for some part of his automobile.

Bumpers and grilles—hoods and fenders—body panels and deck lids—frames and bracings—wheels and hub caps represent a few of many applications of N-A-X HIGH-TENSILE steel to the modern car.

MAKE A TON OF SHEET STEEL GO FARTHER
Specify—
N·A·X
HIGH-TENSILE STEEL

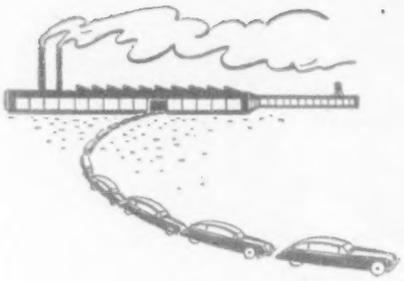
N-A-X HIGH-TENSILE MEETS ALL REQUIREMENTS OF S.A.E. 950

GREAT LAKES STEEL CORPORATION N-A-X ALLOY DIVISION • DETROIT 18, MICHIGAN
Unit of National Steel Corporation

Assembly Line . . .

WALTER G. PATTON

Car prices on the way down . . . Trend coming faster than most people think . . . Details not always in public announcements.



DETROIT — Car prices are coming down—faster than many people think.

There have been only two publicly announced auto price cuts since the war. It will be recalled that a little more than 2 years ago, Ford announced its prices were being reduced $50. However, the company was unable to hold the priceline single-handed. Prices were advanced in August 1947. Another increase was tacked on when the 1949 Ford models were introduced.

More recently, GM announced a price reduction of $10 to $40 (IRON AGE, Mar. 3, p. 120) making the second price cut announced by car manufacturers since automobile production was resumed following the war.

There are, however, many ways in which car prices can be reduced without making any public announcement. Here are some of them: (1) Trade-in allowances can be increased. (2) Accessory "packing" can be eliminated. (3) "Demonstrators" can be sold at a substantial discount. (4) New lines of cars at lower prices can be introduced to replace existing models.

Although some of the roads to automobile price cutting listed above may not be immediately recognized as a reduction in the price of the car, it can be shown, in each instance, that the customer's outlay for transportation has been in effect reduced.

Of course, the time-tried method of cutting new car costs has been to give an increased trade-in allowance to the prospective buyer. During periods of extreme tightness in the auto market, many car dealers were accused of insisting on a trade-in. Now many dealers frankly tell the customer they would prefer a clean deal. Nevertheless, the percentage of cars being traded-in is increasing — as well as the dealer's allowance. This is particularly true where the sale involves a car retailing at $2,000 or more.

Auto dealers are presently expanding their sales force, not only because they anticipate new cars will be harder to sell, but also because they expect they will have to sell more used cars to move the new cars.

In part, the declines in the price of cars being sold at auction are seasonal. Few observers, however, are ready to credit the entire drop in sales to seasonal factors.

Complaints against dealers packing cars with accessories have practically disappeared. In many instances, dealers are advertising delivery of the new car, "As you order it." Some dealers—Hudson, Kaiser and Lincoln—are advertising delivered prices. Car producers, it is understood, have played an active part in urging their dealers to adopt such policies. This, too, is a subtle form of price reduction to the new car buyer.

IN most cities of the country, "demonstrators" are again being offered for sale. As a matter of fact, few auto dealers, until recently, have had to demonstrate cars for prospects. It is quite conceivable that the number of "demonstrators" being offered to the public will easily outrun the number of cars actually used for the purpose. However, with prices on used car lots in a slump, it has again become profitable for the dealer himself to sell such cars rather than turn them over to a used car lot. This is another undeclared form of price reduction.

Introduction of a new line of cars at a lower price than the present models is obviously another subtle form of price reduction, particularly if the new car replaces a substantial number of the higher priced models. At the moment, the new Kaiser "Utility" can be regarded as an example. The new Dodge and Plymouth with the short wheel base could easily become another example, particularly if sales opposition to the 1949 cars begins to pile up.

These are, of course, only the fairly obvious means of reducing the price of a new car. When, if ever, auto dealers begin to give a tank full of gas, extra service and maybe an accessory or two—in addition to a generous allowance for your present car — then auto prices can be said to have been reduced substantially.

This is still far away—almost as far as the day when an auto dealer was willing to bet his customer $50 he wouldn't buy a certain new car.

It is only fair to suggest, too, that the $1,000 car will hardly return much more quickly than a 100-cent dollar. As most Detroiters see it, as long as inflation is with us the price tags on cars will remain fairly close to existing levels. But if and when competition returns in full force, they add, the means toward acquiring these cars—even with their high price tags—will be somewhat facilitated. Many observers think the industry has already seen the start of a movement in the direc-

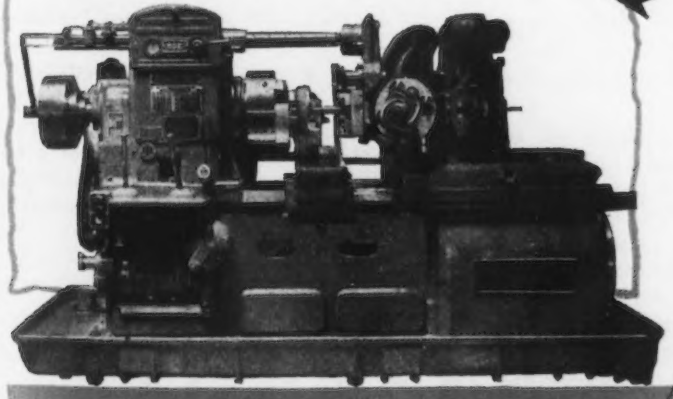
A 5 MINUTE JOB

WHEN IT'S DONE ON A P&J 5DE WITH P&J TOOLING

The finest Automatic Turret Lathe built — one like the Potter & Johnston 5DE, for example — is no better for a given job than the tooling that's applied to that job.

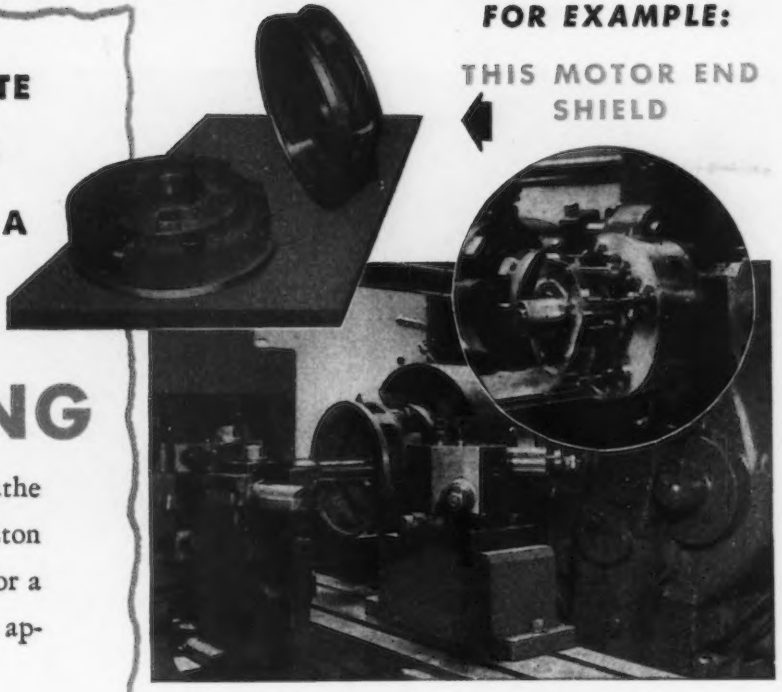
Potter & Johnston Tooling Engineers have the experience and the ingenuity to work out the one best combination and sequence of machining operations for high speed, high precision, low cost parts production.

It will pay you to send parts or prints to P&J for recommendations and estimates. Seeing what we can do puts you under no obligation and may point the way to production gains and savings of substantial importance.



FOR EXAMPLE:

THIS MOTOR END SHIELD



P&J TOOLED FOR THESE SUCCESSIVE OPERATIONS:

Closed side to spindle . . . gripped by 3 jaw chuck.

1st T.F.: Rough bore hole; rough turn O.D.; rough bore two dias.; machine dovetail groove in O.D.

2nd T.F.: Straddle face small hub; rough face bottom of counterbore; rough face end.

3rd T.F.: Finish bore hole; finish turn O.D.; finish bore counterbore; chamfer.

4th T.F.: Finish straddle face small hub; finish face bottom of counterbore; finish face end.

5th T.F.: Drill 6 small holes.

Inset pictures the P&J multiple drilling setup on 5th T.F., an exclusive P&J feature that saves a lot of time and trouble.

All done in 5 minutes on this P&J 5DE Automatic Turret Lathe: **a powerful, rigid production unit with 20 changes of speed, arranged in five sets of four automatic changes; 24 feeds arranged in geometric progression; automatic binding of turret following index; direct cross slide action and constant high speed traverse motion to cross slide and turret slide. Write for Bulletin giving complete specifications.**

5DE AUTOMATIC TURRET LATHE

Potter & Johnston Company

Pawtucket, R. I.

subsidiary of Pratt & Whitney Division Niles-Bement-Pond Company

P&J

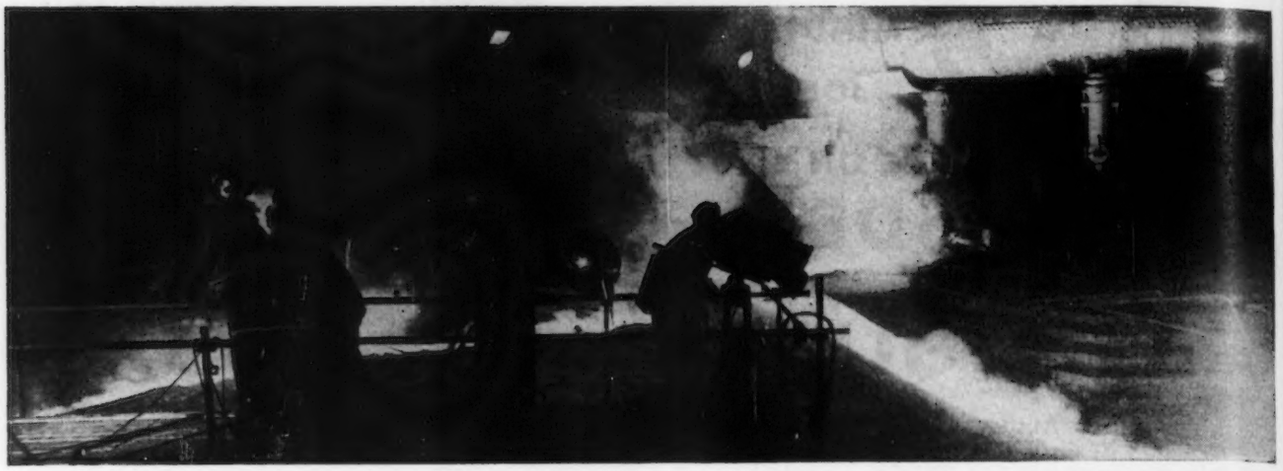


Photo courtesy of Ford News Bureau

VIDEO FOR BRITAIN: *In a recent television broadcast from the Ford Works, Dagenham, England, the British Broadcasting Co. brought their ace photographers and commentators into the plant for the show. The photograph shows the tapping of the blast furnace as the television cameras were at work.*

tion of lower prices for cars even though manufacturers' price announcements have been relatively few and unimportant.

* * *

THE possibility exists that March may be the biggest month of auto production during 1949, despite the fact that Hudson, Kaiser-Frazer, Lincoln-Mercury and Willys-Overland are presently operating on curtailed production schedules.

One reason for the present situation is that March will have 22 working days. Looking further, the auto industry is practically free both of strikes and the aftermath of strikes at the moment. Also, ample steel supplies are rolling in.

A look at the individual producers shows better what is happening. Chrysler has just about completed its changeover and is only beginning to roll again. Chevrolet has boosted its output to more than 17,000 per week and the production curve is still climbing. Other GM divisions are cashing in to the fullest extent possible on the favorable public reception to the recent showing of the cars.

Packard will continue to push production throughout the month, it is expected. Studebaker, it is reported, has already boosted its schedules. Kaiser-Fraser and Willys should be back again on nearly full schedule before the end of the month. Nash, with a better sales prospect ahead, is not likely to reduce its production schedules during March. Only heavy truck output seems definitely to be in eclipse during the current month.

Later on, a somewhat different situation may prevail. There will be few months with 22 or more working days. Strikes or the paralyzing after-affects of strikes may be felt. Also, it may well be that some auto companies will not be able to build up their sales volume as rapidly as consumer sales resistance develops.

At the moment, car producers seem to be discounting the possibilities of a 1949 slump. There are no present indications that the Big Three are reducing their production schedules; on the other hand there are indications that commencing in May, Ford plans actually to boost production.

MANY car producers are ordering additional steel where it can be bought at reasonable prices. There are some cutbacks but few cancellations. It is true that the auto makers' inventories, particularly steel inventories, are being closely watched. Caution is the watchword before making hard commitments for conversion steel tonnage.

Nevertheless, the day when auto buyers were reaching out for every available pound of material seems to have passed. Marketing experts are making renewed efforts to appraise their sales potential realistically. There is no break—not yet—in the auto market or the auto builders confidence. Car producers are today taking many steps they have not taken previously to protect themselves against a possible sag in the new car market. Caution signals are flying here but production engineers still have the green light for maximum output.

If there are any serious curves in the road ahead—and making allowance for the possible effects of strikes and model changes—March may very well be the peak production month for the year 1949. From here, it looks like March output may exceed 500,000 units.

* * *

Although official negotiations are not scheduled to begin until May 15, Ford has notified both union officers and its 106,000 hourly employees that the company will resist to the limit efforts to raise wages either through a wage increase or a company-financed welfare program.

As yet the union has made no formal reply to the Ford letter although it is anticipated that Henry Ford's statement in Philadelphia last fall that a fourth round of wages is "probably inevitable" will be used by the union as an argument for boosting wages. Ford officials contend that the younger Ford's statement has been widely misinterpreted.

TRANSUE FORGINGS

USUALLY COST LESS AT THE POINT OF ASSEMBLY

Consult our engineers when you are contemplating conversion to forgings or when you are in need of reliable forging service.

Large aircraft forging produced by Transue & Williams... Weight, 320 lbs.; length, 29 inches; width across the T section, 17½ inches.

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STEEL FORGING CORPORATION • ALLIANCE, OHIO

SALES OFFICES: **NEW YORK • PHILADELPHIA • CHICAGO • INDIANAPOLIS • DETROIT • CLEVELAND**

OVER 50 YEARS OF FORGING PRODUCTION EXPERIENCE

Washington . . .

EUGENE J. HARDY

• Administration officials hedge on economic program . . . Industry expansion program stirs up intercabinet controversy . . . Capitol Hill seen weakening on capacity proposals.

WASHINGTON—The many-sided nature of the administration's economic control measure (HR 2756) introduced several weeks ago (THE IRON AGE, Mar. 3, p. 122), has brought forth considerable speculation as to how warmly this program is supported by the top-level members of Mr. Truman's official family. On this point, it is generally conceded that wholehearted support is conspicuous by its absence in regard to specific portions of the program.

Three top officials who do not wholly support the program or qualify their support with specific reservations are Commerce Secretary Charles Sawyer, Interior Secretary Julius Krug, and Edwin G. Nourse, chairman of the President's Council of Economic Advisers. Coincidentally, Washington rumor circles maintain that these men will not long remain in the President's official family.

The one point on which this trio disagrees or sets forth reservations is perhaps the most controversial portion of the entire program—the authority for the government to force expansion of the steel and other basic industries. Their disagreement is based on three factors: (1) The lack of any accurate study of steel supply and demand; (2) the availability of raw materials; and (3) general disapproval of the economic philosophy surrounding the whole program.

The first factor is one of the major cracks in the planner's armor, for there is no agency in Washington which has a long term study of steel demand which can be termed accurate. This is especially true of the Commerce Dept., the one agency qualified to deal with such matters.

THE Office of Domestic Commerce does have an interoffice study of steel demand which is kept current, but its primary use is for discussion purposes with the Office of International Trade when steel export quotas are being set. This is the best estimate of the current situation which the department is able to develop, but it is not the sort of study which would justify government tampering with a basic industry.

Commerce Dept. officials told THE IRON AGE that they have had "no opportunity to appraise the demand for steel for any extended period. To do so would require a thorough study of consuming industries, technological changes in the steel industry, the location of producing and consuming industries, job and population shifts, the requirements of national security, and many other such factors. Even after this was done we would still have guesses as to demand, more accurate guesses, but still guesses. Such a study would have to be predicated on certain assumptions, which could become invalid overnight."

In other words, the Commerce Dept. does not have any accurate information which could be used to bolster arguments for increasing steel capacity. Where then does the 10 million ton expansion figure originate? It is difficult to pin this one down, but there can be little doubt that Louis H. Bean, Agriculture Secretary Brannan's right-hand man on steel, is some place in the picture. It will be remembered that Mr. Bean issued his first full-fledged study of steel demand in the summer of 1947. (THE IRON AGE, June 5, 1947, p. 96).

THIS study was undertaken at the request of Senator Murray, D., Mont., a leading pro-expansion advocate, when Mr. Bean was on the staff of the Budget Bureau. At that time, Mr. Bean basing his claims on a study of steel history over the past half-century maintained that the nation would need "approximately 20 million tons in excess of present capacity" by 1950 or 110 million tons. This study was in line with an earlier Labor Dept. report on full employment which pointed out that 98 to 122 million tons would be needed by 1950. The smaller figure would be the maximum if the production emphasis was on consumer goods and the larger amount if producer goods were emphasized, according to the Labor Dept.

Mr. Bean's second major effort, also at the request of Senator Murray, came in the summer of 1948, at which time he again reiterated his demand for steel capacity in excess of 100 million tons. At that time, one of his major conclusions was based on the "rising trend in per capita production in prosperity years."

Briefly, then, Mr. Bean, who is regarded as the leading figure in the pro-expansion school, based his now widely-accepted estimates on projections of past trends, rather than the type of exhaustive study of actual demand which the Commerce Dept. claims is necessary before a definitive conclusion can be reached.

BEARING out the absence of any concrete data on the subject, Commerce Secretary Sawyer testifying before the Joint Economic Committee on the President's program stated: "The extent to which this expected increase in (steel) supply, and the improvement in product distribution, will satisfy the present demand cannot be predicted with any degree of precision. In the first place

Storm Sash on Mass Production with AMERICAN MONORAIL

"Hang-on" station with upper level track over the cleaning and painting operations shown in background.

Trolleys travel to dipping station where air-powered drop section lowers carriers to floor-level paint tank.

• A well-known manufacturer of steel office furniture has successfully undertaken mass production of screen and storm sash. A continuously operated finishing department, with a capacity of 80 storm sash and component parts per hour, is made possible by a 300 foot manually operated American MonoRail Overhead Handling System. Of a staff of 60 personnel, only 5 are required in the finishing department. The American MonoRail system transports all the pieces from cleaning and priming tanks to paint dipping vats to ovens to storage. Manual operation was chosen because of the diversity in size and shape of the pieces being finished.

From the simplest hand-operated unit to the most complicated fully automatic system. American MonoRail engineers can suggest a system best suited to **YOUR** problems.

Finished sash travel through oven on monorail tracks which extend through rear door to stock bank.

SEND FOR BULLETIN C-1, a 56-page book showing successful applications of American MonoRail Systems.

THE AMERICAN MONORAIL COMPANY

13103 ATHENS AVENUE **CLEVELAND 7, OHIO**

the calculation on demand in a *peacetime free economy*, the total demand being the sum of thousands of individual independent pressures, is not and cannot be a precise operation. More important, however, we do not have the power to collect the kind and quantity of information we would need in order to make the best judgment possible as to the probable supply and demand.

"Looking at the immediate future, we can say that if the anticipated increase in production is realized, the steel situation will be eased materially, though even the expected improvement will not make it possible to meet all projected domestic and export demands in 1949."

SECRETARY KRUG, appearing before the same committee, also endorsed the President's program, but pointed out that "it would be of no avail, for example, to increase steel plant capacity if at the same time we could not assure the raw materials required to support increased capacity. And, similarly, we must assure the supplies of raw materials needed to support future additional increases in steel output." He then explained in great detail the supply problems in regard to various raw materials, including scrap, iron ore, coking coal, manganese and chromite, declaring that "substantial increases in the output of steel will require corresponding increases in the supplies" of these materials.

Dr. Nourse has thus far remained silent on the White House proposals, but they have been warmly supported by the other members of the council, Leon H. Keyserling and John D. Clark. However, it is an open secret in Washington that Dr. Nourse is flatly opposed to government construction of plants in any of the basic industries.

While this opposition and lukewarm endorsement of these policies exists in the President's official family it does not come out too openly for obvious reasons. One of the most important of these is the acknowledged fact that if any department of government opposed the program as such, even in private meetings, that department would no longer be consulted and would no longer have any voice whatsoever regarding the specific issue then at hand.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

ANOTHER MAGAZINE ARTICLE... THEY DUG UP AN OLD HAND-RATCHET DRILL TO SHOW TH' FIRST MACHINE TH' BULL OF TH' WOODS WORKED ON!
I HALF WISH WE HAD THEM YET--I THINK SCHEMIN' TO GET OUT OF THAT MADE HIM!
YEH, I THINK I'D OF TRIED TO BE ANYTHING ELSE --YOU CAN BE DROVE UP, Y'KNOW!
THE TORTURE RACK
J.R.WILLIAMS 3-11
T. M. REG. U. S. PAT. OFF. COPR. 1949 BY NEA SERVICE, INC.

On Capitol Hill, Senator O'Mahoney, D., Wyo., chairman of the Joint Economic Committee, declared last week that "study, rather than action," is of paramount importance in the steel capacity question at this time. Whether or not Mr. O'Mahoney has shifted his views in regard to government construction of steel plants remains to be seen. But some members of Congress point to the temperate language employed in the committee's report on President Truman's economic proposals, and cite this as an example of a softening of the Democratic position on steel capacity. Only a few months ago there was much heated talk about the need for "immediate" construction by the federal government of new steel capacity. Such talk has abated considerably of late.

Mr. O'Mahoney's committee expresses itself this way: "There is, of course, no assurance that those not practically engaged in the industry see the forest any better than those inside it.

"Goals projected on the basis of making maximum profits during booms-and-busts may be lower than those required for purposes of economic preparedness or for high-level sustained production and employment.

"Only continued and close study can provide the beginnings of an answer to questions such as these on which, at present, so little is known."

With the passing of each week, supply and demand come closer into balance. Members of Congress know this, and key officials in the administration know it. The recent tempering of their earlier stands on steel expansion simply comes under the heading of "smart politics."

ECA Commitment Extended

Washington

• • • **Letters of** commitment issued against second and third quarter 1948 ECA funds have been extended through Apr. 30.

The action does not affect the final date, March 31, by which goods must be delivered under ECA form 21PA. It merely allows time after delivery for suppliers to collect required documents and present them to banks for payments.

Locating to close tolerances—2 case studies

Automatic drilling and tapping machines cut costs by locating operations accurately and increasing output per man-hour

Dear Sir:

Automatic drilling and tapping machines locate operations to close tolerances in production because:

All tools operate on the part in the same chucking.

Bushings guide drills and reamers. Bushing plates pilot to the fixtures.

Spindles are located to exact indicator readings.

Automatic unvarying cycles make all parts uniform.

Cost is low when output is high

Notice how low the costs are: 15c for the cam with 56 operations; 2-3/10c for the brake cylinder with 11 operations. These costs include both man and machine on this basis: (1) the current average national wage rate, (2) 80% efficiency, and (3) the machine paid for after only 6000 hours, a fraction of its profitable life. No power or overhead.

Cost is low when a Kingsbury does many operations each hour. Reduce output and naturally unit cost goes up. Sometimes this makes a Kingsbury uneconomical. But if accurate location is a problem, it may still be the best solution. That reminds us of a story.

An expert is surprised

A man who knew our machines saw us one day during the war. "I always thought Kingsburys were high production machines."

"You are 98% right," we said.

"Well then, I just saw some of that other 2%," he said. "An aircraft plant I just visited has a line of 11 Kingsburys. Only one machine was running at a time. Fellow would put one lot of cylinder heads through a machine, shut it off, take the truck load to the next machine and do the same thing there."

"Locating to close tol—," we began.

"Oh, sure, sure, sure," he said. "I realized that right off. After I looked at the job I would hate to do it any other way. Fellows there are tickled to death with their Kingsburys. Said they had several lines of them."

"Indeed they have," we said. "Just ask us to figure a compound angle. We have done so many of these machines we are old hands at compound angles. But at first we had to have 10 engineers figure them. When 2 of them agreed we started with their figures and went on from there."

We admit this application is unusual. We even admit (reluctantly) that there are other ways to drill and tap to close tolerances in production. But we do feel that our proposals for this work merit your serious consideration.

For many high production jobs

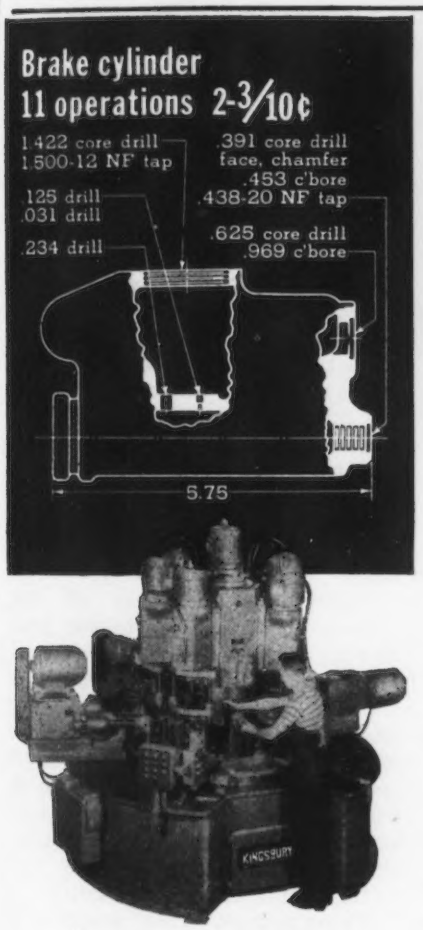
Locating to close tolerances is an important advantage with a Kingsbury. But low cost on high production work is still the main reason for using them. We can make efficient setups for many different jobs — simple or complex, with small or medium operations. (Note the brake cylinder with .031 drill and 1.422 core drill in the same chucking.) Here is why: We can choose from a complete line of standard drilling, tapping and indexing units and attachments. We have designed, built and tooled over 3,500 machines. It is our sole business.

Can we make you a proposal for a tooled machine? Just send a print to our Mr. L. A. Carll. Tell him the operations and hourly output you need. It is worth a few minutes to get the facts.

Sincerely,

Kingsbury Machine Tool Corp.
60 Laurel St., Keene, N.H.

P.S. Free bulletins showing 40 setups are yours for the asking. Please use your company letterhead.



360 PARTS AN HOUR GROSS

To locate every operation exactly, bushings guide every tool except the taps. A ball bearing bushing guides the 1.422 core drill. Other bushings are plain. All bushing plates plug into the fixture or the part itself.

• Ten units operate in turn on each part. The base supports 4 horizontal units, the central column 6 vertical units. Every tool is in easy reach because the working area is not caged in.

• Note the range of operations. A 1.422 core drill (5 hp) and a .031 drill (½ hp) operate in the same chucking.

49 PARTS AN HOUR GROSS

This is one of 10 Kingsburys that an automobile plant uses on related high production jobs to locate accurately peripheral holes inclined at a 40° angle to the surface.

• Bushings in piloted plates guide 3 of the 5 tools for each peripheral hole. The sequence: end mill (guided), drill first step (guided), drill through, line ream (guided) and finish ream. Drilling in 2 steps maintains required output by keeping the time cycle down.

• Each part passes around the machine 4 times. After the 1st, 2nd and 3rd passes, the operator rotates each fixture 90°. Each time around, 2 vertical units with 2-spindle auxiliary heads operate on two .203 holes, and 10 horizontal units operate on 2 adjacent peripheral holes. Five horizontal units are 22½° left of the radial line, 5 are 22½° right.

85

KINGSBURY

AUTOMATIC DRILLING AND TAPPING MACHINES
for Low-Cost High Production

West Coast

ROBERT T. REINHARDT

• Railroad car building gets boost on Coast . . . Cal Tech study may find cure for cavitation of metals . . . K-F blast furnace cuts production.

SAN FRANCISCO — Railroad car construction was given the high-ball in the West with announcement that Pacific Car & Foundry Co. of Seattle, Wash. has just closed two contracts for a total of 500 new refrigerator cars and with production now well under way by Pacific Fruit Express Co. on 3000 refrigerator cars planned for completion this year.

Approximately 100,000 tons of steel—most of it from the West—is going into this car building program.

Pacific's contracts are with the Northern Pacific Railway for 250 40-ton cars and with Western Fruit Express for 250 50-ton cars. In addition to these orders this company has a new contract to rebuild 100 refrigerator cars for Northern Refrigerator Lines which will be completed at the Everett Pacific Shipyard Div. of the company, while the new construction will be done at the Renton, Wash. plant.

Construction of the 500 cars will require an additional 500 employees according to company officials, and the first of the two contracts will start in approximately 3 weeks and assembly work will begin about the first of May.

According to the purchasing department at Pacific Car, most orders have already been placed for steel with only a few items difficult to get.

It is estimated that construction of the 40-ton cars will require approximately 25 tons of steel, forgings, castings, etc. per car. This is broken down into the following net tonnage figures per unit: billets and slabs, .30 ton; shapes, 4.15 tons; plates, 2.85 tons; bars, .63 ton; pipe, 1.0 ton; sheets and strip, 4.60 tons; wheels, 2.80 tons; axles, 1.41 tons; miscellaneous forgings, 4.6 tons; steel castings, 3.60 tons; miscellaneous, 1.07 tons.

Pacific Fruit Express, owned jointly by the Southern Pacific Co. and Union Pacific R.R., already has completed 125 of the 3000 cars scheduled for delivery this year, and is doing its own assembly work at its shops at Colton, Roseville and Los Angeles, Calif. Western Pacific R.R. has 250 gondolas on order, and scheduled for delivery in the second quarter of this year, at the Greenville Steel Car Co. in Pennsylvania.

The Southern Pacific R.R. still has about 7000 more cars on order for its entire system, none of which are being built in the West. This will complete its postwar car building program which involves approximately 20,400 units.

All major western steel producers are participating in this program in varying degrees in line with the government allocations of steel for this purpose.

LOS ANGELES—Although building construction in general has fallen off somewhat in this area, there is little evidence of a slackening in demand for heavy and light structural steel.

Most of the building involving heavy structurals is the result of long-range planning and the backlogs for this type of material are considerable with most fabricators here. Earlier a few companies had indicated that there might be a slight softening in the market, but if anything, now there are some signs of revival.

Latest reports on large public buildings indicate that costs have declined slightly which may encourage continual building in major projects. One steel distributor, planning a three-story warehouse here, is postponing actual construction for at least 3 months on the advice of a contractor who indicated that by that time he would be able to figure a reduction in labor costs because of increasing efficiency being evident. This contractor anticipates that his labor efficiency will be 25 pct greater by that time.

PASADENA, Calif. — Details learned in hydrodynamic studies in a water tunnel at the California Institute of Technology soon may be made available to industry to aid in solving some of the problems of wear on metals caused by cavitation. Some basic changes in ship design may be an eventual result.

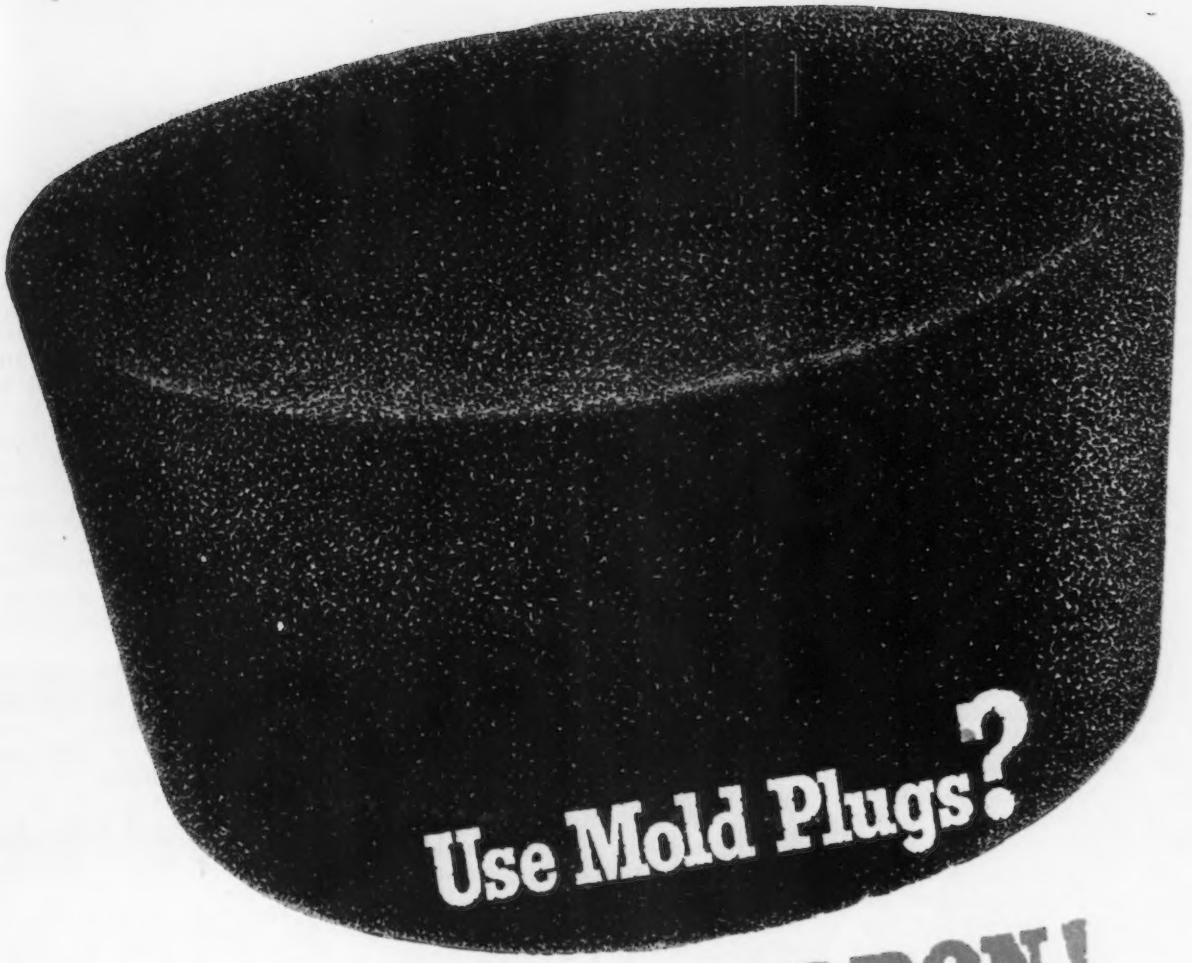
The water tunnel, which tests stationary ship models in a manner similar to tests on planes in wind tunnels, has completed postwar adjustment and now is working on peacetime projects, it was disclosed to the public for the first time last week.

Speeds of 100 ft per second (75 mph), never before attained in a water tunnel, are used for the tests.

Under the direction of Dr. Robert T. Knapp, associate professor of hydraulic engineering, scientists are working with Navy men in studying cavitation. This phenomenon occurs when objects move through a liquid at high speed which produces bubbles which suddenly appear, grow, collapse, appear again and collapse again. During this process the metal contacted is worn away.

Water pumps, ships' propellers, hydroelectric turbines and most other kinds of hydraulic equipment often suffer damage from cavitation.

The problem has been so severe that the old Normandie customarily went into dry dock to have propeller blades replaced or repaired after each trip. Hydraulic engineers have improved propellers and ship design since the day of the Normandie's greatness, but periodic repairs still are required.



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The same is true of turbines in hydroelectric plants. Parts worn out by cavitation must be replaced or new metal welded into holes made by this little-understood phenomena. Turbines at Bonneville and Boulder Dam had cavitation troubles.

"We now can tell you what causes cavitation and this great wear on metal, but we still don't know for certain how it works," Dr. Knapp said. "When we know this, we can begin hoping to find a cure for it."

The engineers have not yet learned what forces cause such damage to metal and how to control these unknowns.

Dr. Knapp believes that research done in the water tunnel ultimately may affect the design of every machine that moves in a liquid.

Submarines and torpedoes might be able to increase speeds if the problem were solved, scientists speculate. Cavitation bubbles often provided important clues to the presence of underwater craft because of the noise produced. The recurring bubbles also cause loss of efficiency in pumps and turbines and limit the size and speed of turbines. A change in design to solve the problem would increase efficiency considerably here.

THE tunnel at Caltech was completed in 1947 and used mainly in its early phases to study the problems of rockets and depth bombs with particular emphasis on launching the latter from planes.

Aiding the studies are the high speed Navy cameras which take 20,000 frames per second. To view the pictures taken in one second requires over 20 minutes when projected at regular movie speeds. This allows close study of every minute action.

The laboratories also include a free-surface water tunnel for research on bodies moving close to the surface. The flow pattern of water about a moving ship can be studied in this tunnel with water rushing past a stationary ship model.

In the latter experiments, the scientists have found that there are certain wave barriers in water not unlike those found in working toward supersonic speeds in air.

It is certain that each place where cavitation brings trouble, it is caused by pressures, speed or the shape of the object. In the case of ships, streamlining has helped, although Dr. Knapp is not yet ready to commit himself on the exact best shape.

With turbines and pumps it has been known for some time that there is less wear from cavitation where it is possible to have low velocity and high pressure.

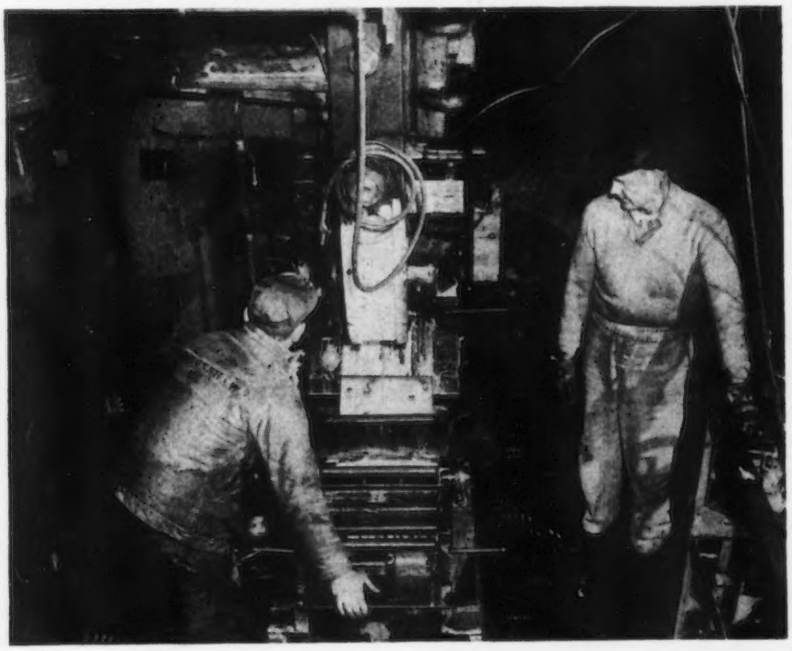
"Some of our work may even affect structural shaping of the underwater portions of steel bridges," Dr. Knapp told THE IRON AGE.

Data is constantly sent to the Navy which finances the Caltech project and much of it has been applied to future designs for underwater bodies such as torpedoes.

While close to the surface, such as when a torpedo is launched from the air or when a submarine submerges, the core of the cavitation bubble is air, in deeper waters where the pressure is greater, the cavitation bubble is supported by water vapor.

In the water tunnel, changes in speed or pressure vary the shape of the bubble, changing it from a ray-like shape to a solid snow-white mass of bubbles.

Tie plates for western railroads are being produced for the first time in Southern California with the installation of new equipment in the Torrance Plant of Columbia Steel Co. Shown here is punch and shearing machine weighing 65 tons and designed to exert 1200-ton pressure.



Using New Type Propeller

Seattle

• • • **The first Kirsten** propeller produced by Pacific Car & Foundry Co. is being installed on a ferry operating out of Newport News, Va. The ferry on this run encounters bad tidal waters and has a difficult time navigating and it is believed that the new type propeller will remedy this situation.

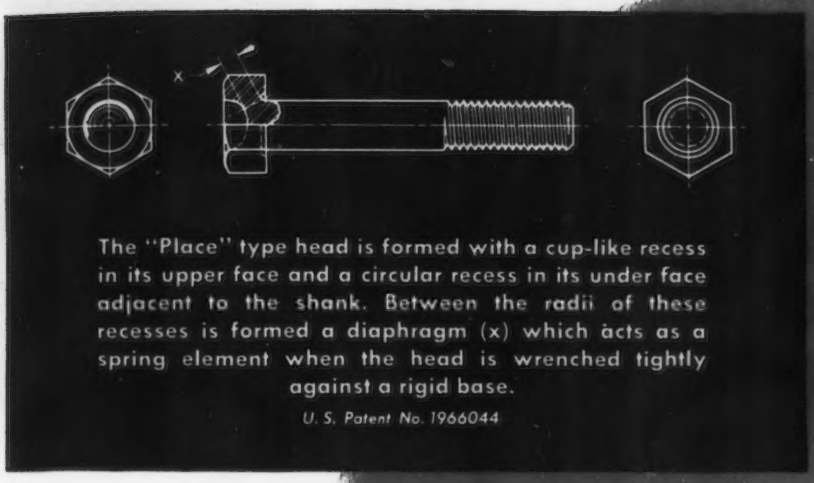
Experimental work has been continued on this revolutionary propeller and a cast crankshaft for the past 2 years. According to company officials the crankshaft has been well received but the propeller is still considered to be in the experimental stage.

Opens Seattle Office

Seattle

• • • **Consolidated Western** Steel Corp., a subsidiary of U. S. Steel Corp., has opened a sales office in Seattle where Hanford Haynes will be in charge.

According to Alden G. Roach, president, an increasing amount of business in this area, including the production and installation of 5000 tons of 12-ft pipe at Grand Coulee Dam and erection of steel tanks for the Hanford Atomic Works, makes this Pacific Northwest office desirable.



The "Place" type head is formed with a cup-like recess in its upper face and a circular recess in its under face adjacent to the shank. Between the radii of these recesses is formed a diaphragm (x) which acts as a spring element when the head is wrenched tightly against a rigid base.

U. S. Patent No. 1966044

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self-locking against VIBRATION

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The unique "diaphragm" head design (see illustrations) produces an axial spring tension when the bolt is tightened, giving it extraordinarily high vibration resistance. Place Bolts may be used with nuts or in tapped holes, but should be used only where it is possible to tighten against a rigid seat.

Made of alloy steel, heat-treated to high physical properties, Place Bolts can be furnished in a wide range of sizes and may be developed for special applications. Typical examples include connecting rod bolts, main bearing cap screws, flywheel bolts and piston pin lock screws.

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PERSONALS

ALWIN F. FRANZ, executive vice-president, Colorado Fuel & Iron Corp.

• **Alwin F. Franz** has been appointed executive vice-president of the Colorado Fuel & Iron Corp., Denver, and its subsidiary companies. Mr. Franz has recently been elected a director of the corporation. Previous to 1945, when he joined Colorado Fuel & Iron, he had been associated with Alan Wood Steel Co., where he served as general superintendent of the steel division. **Jay J. Martin,** works manager of the Pueblo plant, has been named vice-president in charge of operations for the corporation and subsidiaries. Mr. Martin came to CF&I in 1926 from the Youngstown plant of Carnegie-Illinois Steel Corp., where he served as first helper in the openhearth department. Mr. Franz and Mr. Martin continue to maintain headquarters at Pueblo, although Mr. Franz maintains a similar office in Buffalo. **John S. Hawley** has been appointed assistant to the executive vice-president of CF&I, with headquarters in Buffalo. Mr. Hawley, formerly in charge of operations in the California Wire Cloth Corp., a California subsidiary, had been assistant to Mr. Franz during the time the latter was vice-president in charge of operations.

• **Robert A. Stauffer** has been elected vice-president and director of research of the National Research Corp., Cambridge, Mass. He has been associated with the company since 1942.

° ° °

• **A. M. Tredwell, Jr.,** has been made assistant to the president and director of personnel, Sharon Steel Corp., Sharon, Pa. Mr. Tredwell joined the company in 1930 and has served in various capacities in industrial engineering, industrial relations and personnel work. **J. D. Neuman** has been made assistant vice-president. Mr. Neuman started with Sharon in 1931 and for the past three years has been director of purchases and general assistant to the president.

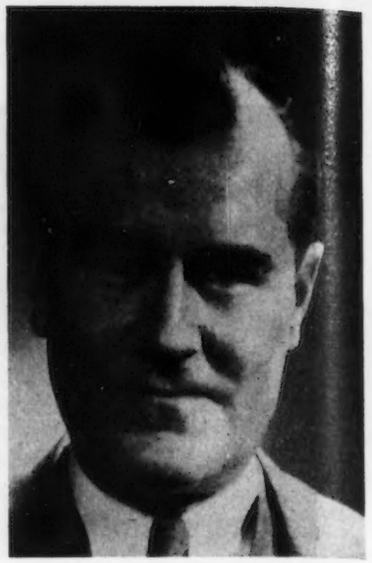
• **Donald C. Duvall** has been appointed chief industrial engineer for the Monessen and Allenport plants of Pittsburgh Steel Co., Pittsburgh. **Carl A. Breuer** has been named chief of production planning at these plants.

• **Howard C. Rodgers** has joined Youngstown Sheet & Tube Co., Youngstown, as superintendent of the tin mill finishing department. Prior to joining Youngstown, Mr. Rodgers had been tin house and electrolytic superintendent for the Tennessee Coal, Iron & Railroad Co., Birmingham.

• **Irwin H. Cornell,** recently retired vice-president and sales manager of St. Joseph Lead Co., has been elected vice-president of Cornell Iron Works, Inc., Long Island City.

• **H. W. MacIntosh** has been appointed treasurer of L. O. Koven & Brother, Inc., Jersey City. Mr. MacIntosh has been in charge of purchasing and stores control for the past 29 years. He continues in these activities in addition to his new duties.

• **Richard H. Koehler** has been appointed advertising manager of the Stearns Magnetic Mfg. Co., Milwaukee. Mr. Koehler succeeds **Hugh Sharp** who has resigned from Stearns to join Advertising & Publicity Associates. Mr. Koehler had formerly been associated as advertising manager with Vincent-McCall Co.



JOSEPH H. TREANOR, vice-president, Mystic Iron Works

• **Joseph H. Treanor** has been elected vice-president of the Mystic Iron Works, Boston, a subsidiary of Eastern Gas & Fuel Associates. Mr. Treanor joined New England Coke Co., another Eastern Gas & Fuel subsidiary, in 1928, and has served as vice-president of that company since 1948.

• **John A. Skogsberg** of the rolling mills department, American Steel & Wire Co., Worcester, and an authority on hot rolling mills operations, has retired. He has served the company continuously since 1900.

• **Ralph G. Harmon** has been made district manager of the industrial and steel and tube divisions in Birmingham, Timken Roller Bearing Co., Canton, Ohio, replacing **F. B. Carney**, who has resigned. Mr. Harmon joined the Timken organization in 1935 and previous to his new appointment had served as a sales engineer in the Chicago office of the company. **M. S. Downes** has been appointed general sales manager of the railway division, succeeding **W. C. Sanders,** who died. **J. E. McCort** has been appointed assistant general sales manager of the railway division. Mr. Downes joined the company in 1926 and served as assistant to the general manager previous to his appointment as general sales manager. Mr. McCort joined the company in 1937 and had been district manager at Cleveland since 1943.

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35 Sizes • Ratios of 10:1 to 1200:1
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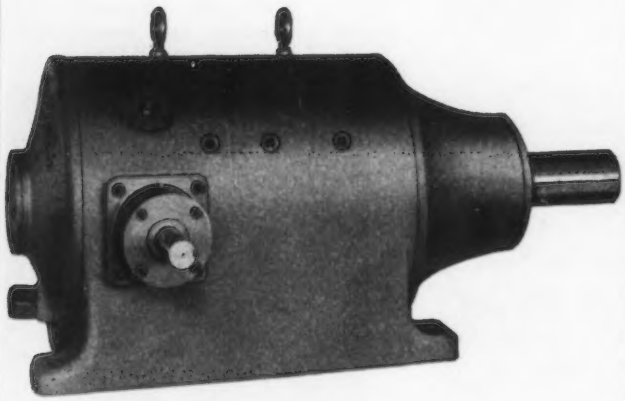

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EUGENE P. MAPEL, vice-president, Methods Engineering Council.

EDMOND A. NEAL, assistant director of sales, Nicholson File Co.

• **Eugene P. Mapel,** director of training and education at Carnegie Illinois Steel Corp., Pittsburgh, has been named vice-president in charge of the sales consulting division of Methods Engineering Council, Pittsburgh.

• **Arthur A. Batts,** chairman of the board, Carborundum Co., Niagara Falls, N. Y., has retired after 48 years with the company. He served as president of the company from 1942 to 1947, and had previously been secretary and a director.

• **George S. Morrison** has been named manager of the new sales zone in Denver for Pontiac Motor division of General Motors Corp., Pontiac, Mich. Mr. Morrison formerly served as assistant zone manager at Los Angeles. He has been 12 years with Pontiac, having held assignments as office manager and car distributor at San Francisco and Los Angeles and district manager and business management manager at Los Angeles. Assisting Mr. Morrison are **William H. Hunter,** former district manager in New York City, as business management manager; **J. C. Corington,** office manager and car distributor; **W. W. Boggess,** service manager; **G. E. Hentschell,** parts and accessories merchandising manager; **A. W. Greenawalt** and **H. J. Gordon,** district managers and **R. P. MacDuff,** service adjuster.

• **Edmond A. Neal** has been named assistant director of sales, Nicholson File Co., Providence, R. I. Mr. Neal joined Nicholson in 1939 as a service engineer. He has served as sales representative in the Philadelphia and in the New York areas and in 1946 joined the Providence office of the company, assisting in market analysis and sales management.

• **Walter H. Winter,** assistant secretary and assistant treasurer, Symington Gould Corp., Rochester, N. Y., has retired. Mr. Winter has been with Symington since 1929 and had previously been associated with American Steel Foundries, Inc.

• **Arthur B. Bacon** has been named superintendent of the Sikes Co., Inc., Buffalo. He had formerly been with the American Bosch Co., Springfield, Mass.

• **Charles G. Grimes** has been appointed purchasing agent for Plume & Atwood Mfg. Co., Waterbury, Conn. Mr. Grimes joined the purchasing department of the company in 1946.

• **Roland C. Disney,** vice-president and general manager of the Whitcomb Locomotive Co., Pittsburgh, has resigned, effective March 15. **Charles K. Olson** has been appointed general manager of the company succeeding Mr. Disney.

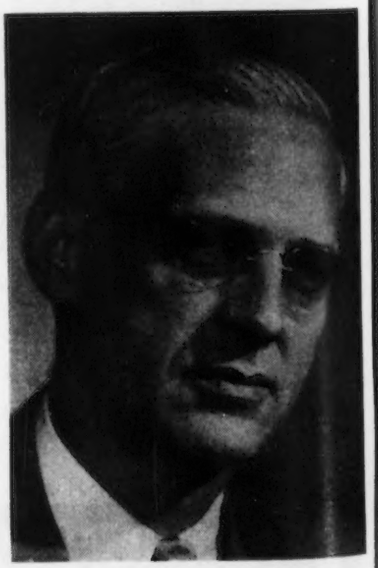
• **Simon D. den Uyl** has been elected president of Bohn Aluminum & Brass Corp., Detroit, succeeding **Peter A. Markey,** who resigned. **Emerson Frantz** has also resigned as vice-president and general sales manager. **R. J. Rishirt** has been elected vice-president. **F. M. Taylor** has been appointed treasurer; **C. M. Adams,** secretary; **V. C. Marowca,** assistant secretary and **R. J. Warner,** assistant treasurer.

• **Barron D. Berger** has been named chief engineer, National Electric Welding Machines Co., Bay City, Mich. He had formerly been assistant chief engineer in charge of special machine design at Federal Machine & Welder Co.

• **Bradley C. Higgins** has been appointed vice-president and purchasing agent, Livingstone Engineering Co., Worcester. Mr. Higgins has been a director of the company since its organization and until recently served as assistant to the president.

• **R. G. Neilson** has been appointed general manager of production and manufacturing for Mackintosh-Hemphill Co., Pittsburgh and Midland, Pa. Mr. Neilson joined the firm in 1933 and most recently has been in charge of the roll shop at the company's Garrison plant.

R. G. NEILSON, general manager of production and manufacturing, Mackintosh-Hemphill Co.



• Robert **G. Baumann** has joined the Chemical Dept., General Electric Co., Pittsfield, Mass., as assistant sales manager of silicone products, with headquarters at the company's new plant at Waterford, N. Y. Mr. Baumann had been an assistant regional sales manager with the Ozalid Div., General Aniline & Dye Corp.

• **Louis C. McAnly, Jr.,** has been appointed assistant to the general sales manager of the Maytag Co., Newton, Iowa, succeeding **J. B. Claiborne,** who is now sales manager of the East Coast Co., Jacksonville, Fla. Mr. McAnly joined Maytag in 1946 and recently had been acting as manager of retail sales training. **P. H. Cobbs** has been appointed superintendent of the Maytag automatic washer plant and **Wesley Bissett,** manager of the Maytag Hampton plant. Mr. Bissett succeeds **Harry Weston,** who died recently. Mr. Cobbs has been with the company more than 26 years and Mr. Bissett has been with the company 13 years.

• **Donald Sherwood** has been appointed district manager of the newly-established Pittsburgh office of H. M. Harper Co. Mr. Sherwood had been previously located at the Cleveland branch office of the Harper Co., following intensive training and sales experience at the Chicago headquarters.

DONALD SHERWOOD, district manager, H. M. Harper Co.

ALLISON R. MAXWELL, JR., assistant general manager of sales, Pittsburgh Steel Co.

• **Allison R. Maxwell, Jr.** has been appointed assistant general manager of sales, Pittsburgh Steel Co., Pittsburgh. He became associated with the company in 1935 and since 1946 has served as manager of control planning.

• **C. H. Benbrook** has been appointed director of research and development of the Ozalid Div. of General Aniline & Film Corp., New York. Mr. Benbrook joined American Cyanamid Co. as a research chemist and was associated with that company until 1943 when he came to the Central Research Laboratory in Easton, Pa.

• **J. R. Elder** has been appointed field representative for the Tomkins-Johnson Co., Jackson, Mich. Mr. Elder had formerly been associated with the Kalamazoo Stove Co. and Industrial Tool Engineering Corp.

• **Roland F. Boehm,** formerly district sales manager of the Houston office of Mathieson Chemical Corp., New York, has been transferred to the ammonia department in New York. **O. J. Theobald, Jr.,** formerly district sales manager of the Charlotte, N. C., office, has been appointed to succeed Mr. Boehm at Houston. **J. F. Carey,** formerly a sales representative in the Charlotte territory, has been named district sales manager at the Charlotte office.

D. R. STAMY, vice-president and sales engineer, Tool Industries, Inc.

• **D. R. Stamy** has resigned as vice-president in charge of engineering for the Standard Products Co., Detroit, to become vice-president and sales engineer with Tool Industries, Inc., Detroit.

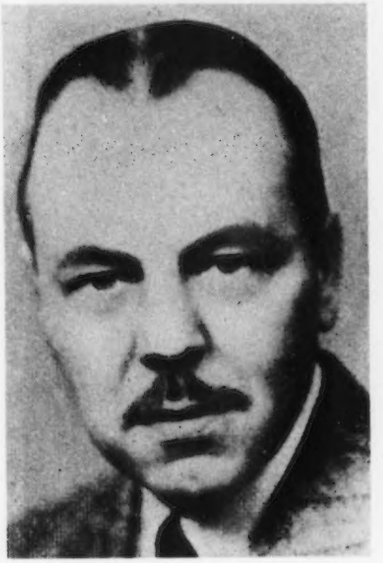
• **Arthur E. Stoddard** has been elected a director and president of the Union Pacific Railroad Co., succeeding **George F. Ashby,** who has retired. Mr. Stoddard has been with Union Pacific since 1916. He was made general manager in 1947 and vice-president in 1948. Mr. Ashby joined Union Pacific in 1911, serving in various capacities until he was elected a vice-president in 1941, executive vice-president in 1944 and president in 1946. **Newcomb Carlton,** who has been a director of the company since 1922 and a member of the executive committee since 1924, has resigned and has been succeeded by **Robert A. Lovett.** Mr. Lovett has been a director of Union Pacific since 1926 and a member of the executive committee since 1930.

• **Dudley C. Jackson** has been appointed distributor of centralized lubrication equipment in the Chicago area for Trabon Engineering Corp., Cleveland. Mr. Jackson has been associated with Trabon in various capacities since 1935 and for the past six years has been service manager. He has his headquarters in Chicago.

E. A. WARNER, district manager, Union Switch & Signal Co.

• **E. A. Warner** has been named district manager of the New York office of Union Switch & Signal Co., Swissvale, Pa. Mr. Warner joined the commercial department of the company in 1917. In 1937 he was appointed assistant district manager in New York, holding this position until his appointment as district manager.

• **O. N. Stevens** has retired as operating vice-president of Southern Alkali Corp. which is jointly owned by Pittsburgh Plate Glass Co. and American Cyanamid Corp., at the Corpus Christi plant. Mr. Stevens has been associated with the alkali industry since 1907 and with the Columbia Chemical Division of Pittsburgh Plate Glass for the past 26 years. **Stanley J. Hultman,** superintendent of the Lake Charles, La., plant, has been named works manager at Corpus Christi. **Charles E. Weeks,** for the past two years assistant to Mr. Stevens, has been named assistant works manager at Corpus Christi. **C. K. Ballard,** superintendent of the caustic and chlorine department at Lake Charles since 1946, has been named plant superintendent. **Alvin T. Raetzsch** has been appointed superintendent of operations and **Frank W. Woodman,** superintendent of engineering at Lake Charles. **Russell S. Clark** has been appointed divisional power engineer there.



LUTHER A. KLEBER, assistant vice-president, manufacturing, General Steel Castings Corp.

• **Luther A. Kleber** has been appointed assistant vice-president, manufacturing, General Steel Castings Corp., with jurisdiction over the plants at Eddystone, Pa., and Granite City, Ill. He maintains his headquarters at Granite City. Mr. Kleber joined the Commonwealth plant in that city in 1940 and since 1947 has been assistant works manager there. Before becoming associated with General Steel Castings, Mr. Kleber had many years of important service with Taylor-Wharton Iron & Steel Co.

• **Ralph S. Damon,** president of Transcontinental & Western Air, Inc., has been elected a director of the Goodyear Tire & Rubber Co., succeeding **Thomas E. Wilson,** who has resigned. The election is subject to approval of the Civil Aeronautics Board.

• **H. L. Price,** master mechanic in Chicago for the Santa Fe Railway, has been transferred to Albuquerque, N. M., as superintendent of shops, replacing **G. R. Miller,** who has retired. **Harold F. Mackey,** supervisor of Diesel engines in Chicago, has been transferred to Clovis, N. M., as master mechanic, succeeding **G. C. Kistner. Walter L. Huebner,** day roundhouse foreman at Barstow, Calif., has replaced Mr. Mackey in Chicago. **Thomas T. Blickle,** master mechanic at Dodge City, Kans., has been transferred to Chicago.

• **C. Russell Miller** has been named service engineer for Kennametal Inc., Latrobe, Pa., working out of the Cincinnati office. **Henry B. Worthington** has been appointed sales engineer working out of the Springfield, Mass., office. **Thomas J. Kniff, Jr.,** has been appointed application engineer working out of the Philadelphia office.

• **Anthony J. Sanok,** assistant superintendent of transportation, Erie Railroad Co., Cleveland, has been appointed secretary to the executive vice-president of the company. **Thomas E. McGinnis,** trainmaster at Buffalo, has been named assistant superintendent of transportation.

• **F. H. Newsom,** who has been with the B. F. Goodrich Co. since 1923 and has served as Dallas territory manager of the Associated Lines, has been named southwestern division manager of Associated Lines, with headquarters at Dallas. **H. G. Culbertson** has been appointed northeastern division manager at Akron, Ohio; **Benton Thompson** has been appointed northwestern division manager at Springfield, Ill., and **H. M. Rockwell** has been named southeastern division manager at Akron. Mr. Culbertson has been with Goodrich 29 years and since 1941 has served as field division manager, chain store sales. Mr. Thompson joined Goodrich 33 years ago and has been in Associated Lines Sales since 1923. He had been territory manager in Indiana, Illinois and Missouri for several years. Mr. Rockwell has been with the company 26 years and most recently served as manager of distributor sales for Associated Lines.

OBITUARY...

• **John W. Linzee,** 81, planning engineer, Farnum & Murray, Boston, and associated with the construction of the electric railway from Lowell to Ayer, Mass., also in the development of water power on the Androscoggin River in Maine, died Feb. 20.

OBITUARIES

• **Francois de Wendel,** head of the most important steel company in France, The Grandsons of Francois de Wendel & Co., died Jan. 17.

• **Hugh S. Robertson,** vice-president, Harbison-Walker Refractories Co., Pittsburgh, died recently.

• **Gilbert L. Church,** 69, assistant treasurer, Brown & Sharpe Mfg. Co., Providence, died Feb. 27.

• **Dr. Theodore M. Focke,** 78, former dean of Case Institute of Technology, died March 2.

• **Samuel N. Summer,** 64, president, Summer & Co., Columbus, Ohio, died Feb. 27.

• **William J. Grattan,** 75, retired assistant mechanical superintendent, Algoma Steel Corp., Toronto, died recently.

• **Clarence M. Ross,** 62, Federal Bearings Co., Poughkeepsie, N. Y., died Feb. 25.

• **Simon Goldsmith,** 86, chairman of Goldsmith Bros. Smelting & Refining Co., Chicago, died Feb. 28.

• **Herbert N. Morris,** 47, president and founder, Colmor Inc., Sandusky, Ohio, died March 1.

• **Alvin B. Einig,** 65, general manager and director, Motch & Merryweather Machinery Co., Cleveland, died Feb. 27.

• **M. W. Latimer,** 61, manager of Hercules Powder Co. office in Joplin, Mo., died Feb. 23.

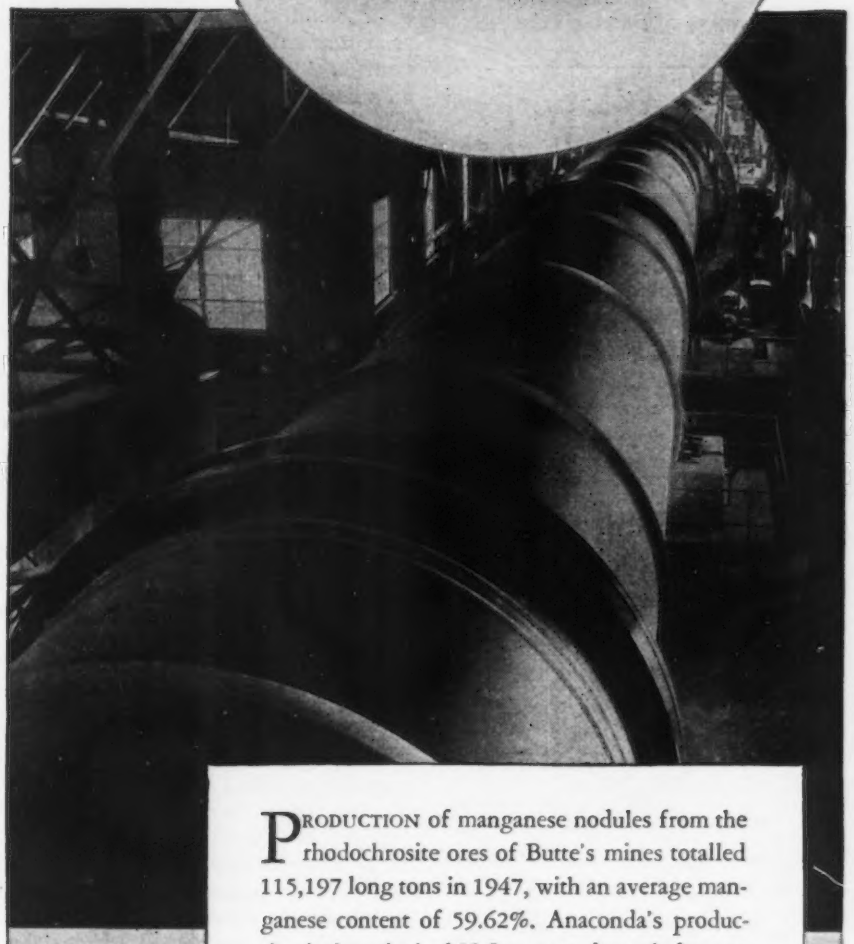
• **James E. Sweeney,** 47, methods engineer for Barcalo Mfg. Co., Buffalo, died Feb. 26.

• **Howard C. Rudisill,** 62, superintendent of the Strode Ave. plant of By-Products Steel Co., division of Lukens Steel Co., Coatesville, Pa., died Feb. 24.

• **Winfred W. Elliott,** founder, Elliott Mfg. Co., Binghamton, N. Y., died Jan. 26.

• **Clarence J. Heil, Sr.,** 52, purchasing agency for Heil Co., Milwaukee, died Feb. 17.

Anaconda
MANGANESE
NODULES



PRODUCTION of manganese nodules from the rhodochrosite ores of Butte's mines totalled 115,197 long tons in 1947, with an average manganese content of 59.62%. Anaconda's production is the principal U.S. source of supply for producers of ferro-manganese and other consumers of metallurgical grade ore.

Illustrated above is the 270-foot kiln at the Anaconda Reduction Works in which the manganese concentrates are sintered at a temperature of 2600° F.

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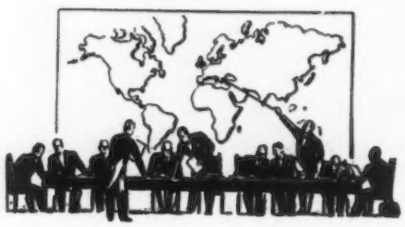
European Letter . . .

• Primary task of scientists to seek knowledge from study of nature, not from human authority . . . Communist political authority sits in judgment on truth of scientific theories.



LONDON—The Dean of Canterbury, in presenting his testimonial to the Soviet Union for the defense in the Kravchenko libel action, has just explained that one of the grounds for his faith in the Soviet system was that it had welcomed science with both hands. In view of recent controversy over the guidance given to scientists in the Soviet Union by the Communist Party, the Dean's metaphor was perhaps not altogether a happy one. The phrase certainly suggested in the first place an overhearty ecclesiastical handshake, but it was also slightly reminiscent of a policeman making an arrest. The Dean clearly assumes that for science to be welcomed by ruling politicians is automatically beneficial alike for society and for science itself. The Soviet welcome is supposed to have conferred on science the glory and the effectiveness which it has lacked in its forlorn struggle to survive during the three conturies since Galileo. There are, nevertheless, grounds for doubting whether the new patronage is quite the unmixed blessing it may at first sight appear to be, and the question involves, not only the position of scientists in the Soviet Union, but the relation of science to the state in all countries. It is a general problem of contemporary society, though presented in a particularly acute form by the recent Soviet political interventions in scientific disputes.

In a speech on Aug. 24 of last year Professor Vavilov, President of the Soviet Academy of Sciences, declared: "Our science, the science of a socialist country on the road to communism, is distinct from bourgeois science because it rests on a basically different ideology and aims at achieving a very different task—the task of an all-round service to the people, its demands, its practice and its needs." If this means simply that the Soviet state, in accordance with an overall plan, endows and directs research for the improvement of technology in agriculture, industry, medicine or armaments, it can no doubt be claimed that such a system differs from the more piecemeal and haphazard applications of science hitherto customary in the lands of private enterprise. But, if this were all, it could hardly be said that there was a difference in science itself as a method of seeking and verifying knowledge about the universe.

IT is at this point, however, that ideology enters in and really does make Soviet science different from bourgeois science. The Communist political authority in the Soviet Union does not merely direct scientists to particular tasks judged to be of economic or military value, but sits in judgment on the truth of their theories. For the party bosses and policemen, like the priests and theologians of other times, are in possession of a body of infallible metaphysical doctrine to which any theory in physics, biology or anthropology must conform or be deemed heretical and dangerous to the order of society.

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As a result of this omniscience of the civil power, it is now as dangerous in Russia as it was in Italy in the days of Galileo for a scientist freely to proclaim the conclusions to which his scientific inquiry has led him. In one respect, however, perhaps because of some lingering sense of embarrassment in defying the standards of bourgeois science, the discipline of the KVD differs from that once imposed by the Inquisition. It was no secret when Galileo was called to account for daring to defend the Copernican astronomy; all Europe knew of it. But the control of thought in Russia operates behind so thick a curtain of dissimulation that it is a matter for dispute whether there is any persecution of scientific opinion or not. In a discussion on the freedom of science at a conference of the Atomic Scientists' Association last October, Sir Henry Dale was challenged to support his assertion that geneticists were being subjected to persecution in Russia and he referred to the case of Vavilov (not the same person as the President of the Soviet Academy of Sciences quoted above):

> In 1942 I happened to be President of the Royal Society, and the name of Vavilov was brought before the Council of the Society, with the strongest kind of recommendation, from those who knew about his work, for election to our foreign membership. He was elected to foreign membership. We heard faint rumors of his having got into some kind of trouble because he openly opposed the teaching of Lysenko, which had been recognized by official authority as the genetic teaching which was conformable to the Marxian philosophy of dialectical materialism. It came to our knowledge in 1945 that somewhere between 1941 and 1943 Vavilov had been dismissed from his appointment and removed from Leningrad to a distant town in Russia where there was known to be a concentration camp, and that somewhere between 1941 and 1943 he died. We naturally wished to know, simply for the completion of our records, what was the date of his death. . . . We have been entirely unable to find out. Every inquiry put through every kind of channel has encountered a complete blank. . . . No acknowledgement of any kind has been sent through the Soviet Embassy in London or from Moscow by the President of the Scientific Academy.

Whether or not it is a fact that this scientist, who was considered worthy of the not lightly given honor of election to foreign membership of the Royal Society, perished in a concentration camp on account of dissent from current Soviet scientific orthodoxy, it is clear enough from expressions of the Soviet official attitude that such a fate would not have been an un-

likely one. The welcome given to science with both hands by the Soviet state may bring high honors and lucrative earnings to producers of new frost-resistant seeds or more efficient rocketbombs, but it does not provide the right of the scientist to declare and sustain by argument what he believes to be the truth—a right which has belonged to bourgeois science for several generations and which has long been the condition of the whole intellectual life of western Europe.

IT might be supposed that, however much totalitarian political rulers were resolved to establish a censorship over the sciences, scientists themselves would be united in resisting any such claims to restrict the freedom of scientific inquiry and advocacy, and that a tyranny which Russian scientists are powerless to defy would at least win no approval from scientific circles in countries with liberty of thought. But it is notorious that in fact Communists and fellow-travelers are numerous in the ranks of the scientific profession in western Europe and America and it seems that the reason is to be found in a trend, not of scientific thought, but of thought about science, which has become increasingly manifest in recent years. It is a trend towards the disparagement of pure science as compared with scientific technology and it has been strongly promoted by the growth among scientists of a social conscience, even of a sense of guilt in their profession.

In former times the scientist was liable to be denounced, even after he ceased to be persecuted, for undermining the supposed foundations of religion, but he was not called on to justify his quest for knowledge as such. It was taken for granted that it was worthwhile for human beings to seek knowledge about the universe for its own sake, or if it was not, the quest was at least as good a way as hunting or gambling for employing the resources of a leisured class whose social position was not seriously challenged. The scientist was primarily a natural philosopher and his business was to discover truth; it was more and more recognized as time went on that his discoveries gave mankind new power over nature which had all kinds of practical uses, but the scientist was neither judged by the obvious utility of his work nor was he held responsible for the uses to which soldiers, physicians, farmers or industrialists might put it. The natural philosopher was expected to be remote from the affairs of this world; he did not interfere with other men and they refrained from interfering with him. His very aloofness from human society gave him a special prestige; in the hierarchy of esteem the astronomer, absorbed in the study of the galactic nebulae, ranked higher than the discoverer of a new process for hardening steel, even though his pecuniary reward might be very much less.

All this is now changed. An epoch of wars and revolutions has diverted intellectual interest from the mysteries of the cosmos to the practical problems of human society. The scientist is reproached for his former indifference to the uses of scientific knowledge; he is attacked for his pride in pure science and told that he should think of himself first and foremost as a servant of society, doing his best to be useful in material production and in social engineering. Above all, he is denounced for having brought into existence weapons of unprecedented destructiveness, culminating in the atomic bomb, without having done anything to protect mankind from their abuse.

THOSE scientists of the west whose orbits are affected by the gravitational pull of the Muscovite star have no word to say against the claims of Russia's political bosses to decide theoretical problems of biology or physics, but they are very vocal in opposition to what is, according to them, the real threat to the freedom of science, namely the obligations of secrecy now imposed over a considerable field of research by governments for reasons of military security and the purging of scientific workers from posts connected with national defense on account of real or alleged Communist affiliations. Secrecy in armament research is not new in principle, but it is entirely now much more far-reaching than formerly, and affects a range of subjects of theoretical importance on which publication would have been free only a few years ago. This state of affairs is highly regrettable, but is unavoidable as long as the present international situation persists, and it should be emphasized that Russia is in every field not less, but more, secretive than the western powers. In any case, these restrictions do not involve any control of creed; no scientist in the west is required to subscribe to a scientific doctrine in which he does not believe.

Scientists should consider well the implications of the political control of science as it is now enforced in Russia, and ask themselves seriously whether this is a price they are prepared to pay for being welcomed with both hands by political rulers. It is indeed good that the scientist should be less cloistered than in former days; in a political democracy he is a citizen as well as a specialist in his own profession. There is a vast scope for beneficial cooperation and consultation between political authorities and scientists in all branches of administration, and helpful initiative may often come from the side of the scientist. But the natural scientist as such has no inherent qualification for setting himself up as the savior of society any more than the politician as such is qualified to tell the physicist or biologist what he ought to think about quanta or chromosomes. Indeed, the natural scientist seems to be at a disadvantage in dealing with political matters which neither lend themselves to exact classification nor can be made to follow precise laws. Perhaps it is just because Marxism purports to be an exact science of politics that some scientist finds it so attractive. But the desire to plan the human race into efficiency, prosperity and peace, however creditable it may be as a response to the world's woe, can be a path of disaster if it leads away from the primary task of science, which is to seek knowledge, not from any human authority, but by the direct study of nature. For its own life, science has no other way than the making and testing of hypotheses through observation and experiment and free debate among all qualified specialists. Abandonment of this way is repudiation of the spirit and method of science, even if the octopus welcomes with all its tentacles.

• **SCRAP DILEMMA**—Some observers believe the current drop in scrap prices presages a decline in steel making operations within the next 60 days. Mills have a lot of high priced tonnage in inventory, which in some cases they are trying to get out of the yards and into the furnaces as soon as possible. In a way, buyers are up against a real problem. If they reduce inventory to the bone and operations do not decline, they are over a barrel. If they don't reduce inventory and are caught with a lot of high priced tonnage, that isn't good, either. Trade talk has it that operations in at least one major steel making district will be down to 80 pct of capacity before the end of April.

• **TINPLATE**—Predictions made last December that tinplate demand would be strong during the first 9 months of this year are not being changed by mill sales officials. They report an increase in number of cancellations which are insignificant tonnagewise. They feel that buyers will probably not be fully satisfied for some time. Packers have heavy carryovers though warehouses are inventory conscious. One manufacturer has received permission to use 0.25-lb electrolytic tinplate for oil cans in place of special coated manufacturing ternes and others may follow.

• **CAR SHIFT**—If further resistance to the sale of cars in the highest price field continues to develop, the first step to be taken by car producers will be to shift production to less expensive lines. Ford has already done this in the case of Lincoln; and Kaiser-Frazer's new "Utility" models marks a similar move. Chrysler has an "ace-in-the-hole" for such a market development with its new models having a shorter wheelbase.

• **STEEL EXPORTS**—A meeting of steel mill and merchant export officials in Washington last week developed strong sentiment for the relaxation of export controls over most steel products and pig iron. It appeared that members of the Export Steel Advisory Committee saw the early need to supplement domestic demand for steel by shipments abroad.

• **RAISES FERROMANGANESE**—Sloss-Sheffield Steel & Iron Co. increased its price for standard ferromanganese by $12 a ton effective Mar. 9. The price is now $174 per gross ton f.o.b. Birmingham. Bethlehem Steel Co. also announced a $12 a ton increase effective immediately. Last week E. J. Lavino & Co., Philadelphia, announced an equivalent increase.

• **PRICE CUT**—Granite City Steel Co. has cut the price of cold rolled sheets $10 a ton. This price is effective on shipments on and after Mar. 1. A Granite City spokesman told THE IRON AGE that the price decrease is due to the fact that their scrap and fuel oil costs have come down sharply since the first of the year. They are booked solid through second quarter on cold rolled sheets and the reduction in price was not due to customer pressure. Last October when Granite City started their new mill they informed their customers at that time that due to increased cost of raw materials they would have to raise their prices. In November they raised the price $10 a ton. This latest revision brings Granite City's price back to the old competitive level and former differential historically held between Chicago, Pittsburgh and the Granite City markets.

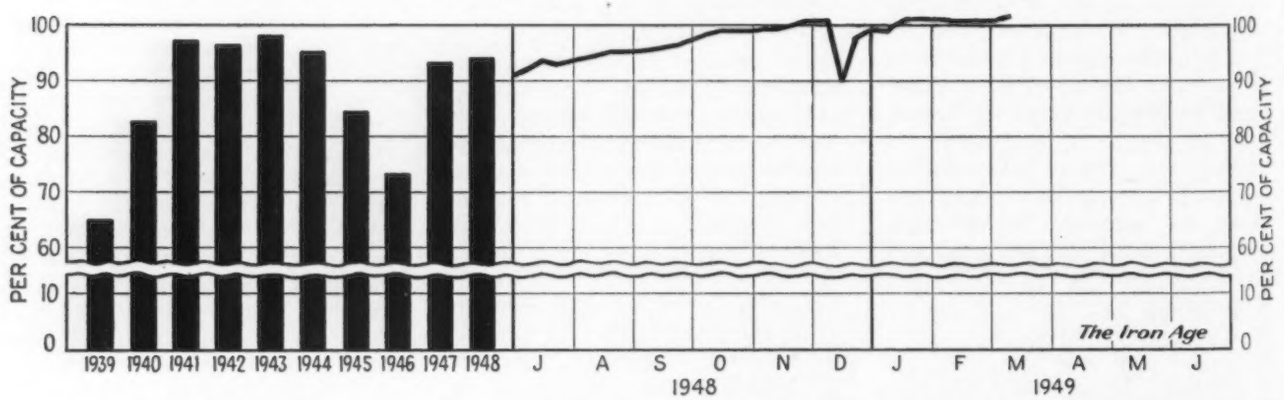
• **HOT-ROLLED BARS**—As in other products, cancellations have been increasing but supply is still very light. Most producers have carryovers of February tonnage still unfilled and no overall quota increases are being made. Cold-drawn bar makers will take all the bonus tonnages now being offered but few can get anything like the tonnages they seek. Mills report demand will have to ease a lot more than it has before cold finishers can hope to build the modest inventories they want.

• **FOLDING**—Glenwood Range Co., Taunton, Mass., one of the oldest and largest stove manufacturing concerns in the country, will close its doors May 31, according to William J. L. Cooper. The company was started in 1879 and once employed 750 persons. Plant machinery has been sold for June 1 delivery. Blaming the highly competitive nature of the stove industry, Mr. Cooper said "We just could not keep up."

• **LAYOFFS**—The New Haven Railroad has laid off a total of 1400 workers "to avoid deficit operations." Layoffs include 957 at its locomotive and car repair shops at Readville near Boston; 343 at its Van Ness shops, New York; and 100 on its Old Colony line. The Railroad reports business 10 pct below last February.

• **ORE TRIP**—Republic Steel Corp. representatives were in Liberia recently investigating a reported 20 million ton reserve of open pit iron ore that assays between 68 and 70 pct iron (THE IRON AGE, Feb. 24, p. 143). A Republic spokesman declined to comment.

Steel Ingot Production by Districts and Per Cent of Capacity



Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
March 1.....	103.0*	102.0*	94.5*	101.0	103.5*	105.0	97.5	95.5	106.0*	102.0	110.0	82.5	91.5	101.0*
March 8.....	101.0	100.0	94.5	101.0	103.0	105.0	99.5	94.0	102.0	106.0	110.0	82.5	112.5	102.0

* Revised.

Industrial News Summary

- ***Russians Use Manganese Ore as Club***
- ***U. S. Stepping Up Imports Elsewhere***
- ***Scrap Market Drops Another $1 a Ton***

RELIABLE information obtained by THE IRON AGE shows that the Russians are trying to blackjack the United States into lifting its embargo on machine tools and steel shipments to the Soviet Union. Manganese ore—vital to steelmaking—is the club the Reds think they hold over this country. About a third of our manganese ore came from Russia last year.

But the Red threat will not work. Government and industry have been aware of this possibility for nearly a year. They are prepared for it. Aid is being given to South African manganese ore mines, imports have been boosted from India and work is progressing on increasing imports from Brazil. With ECA aid the manganese ore export potential of Morocco and the Gold Coast is expanding. Supplies may be tight for awhile but steelmaking will not suffer one iota.

Nor would a shooting war stop this country's ability to pour out steel at the present top rate. High quality manganese ore is included in the government's strategic stockpile. Its real size is confidential. But it is known that if all Russian ore imports were dropped the government could make up this deficiency for as long as 5 years. Or, to put it another way, total industry requirements from all sources could be filled by the government stocks for 2 years—if such an emergency should arise.

This week steel demand on the mills is strong for most products except alloy steel bars and some semifinished steel. At first glance it would appear that this strength is due to fresh or new requirements. But this is not the true picture. There is no dearth of steel orders. And there is no sign that the steel rate will go to pot. But there are ample signs that the increased demand on regular steel mills is due to market conditions which trend toward an overall balance in steel demand and supply.

DEMAND in the industry this week is extra strong because (1) the gray market is gone and its customers are trying to get their steel needs from regular mill sources, (2) conversion deals are going out the window as fast as customers can make the grade; then they knock on regular mill doors for more steel and (3) the industry has given such good service on shipments recently that users smell blood and are pushing for deliveries. All of these factors spell normal steel activities—the first since the end of the war.

Aiding and abetting the rush toward a regular peacetime steel market is the heavy output of steel. This week the rate is at an all-time high—102 pct of rated capacity. That means that finished steel will be pouring out soon at a rate unmatched in modern steelmaking history. It also means that steel users will be getting so much steel in the next few months that they will probably have cause to stop, look and check their inventories.

At the rate steel is being made and shipped today it looks as if the great day—when orders can be placed and shipment will be made on schedule—is not far off. It may—on many products—come sooner than midyear. It certainly will come before some steel people look for it.

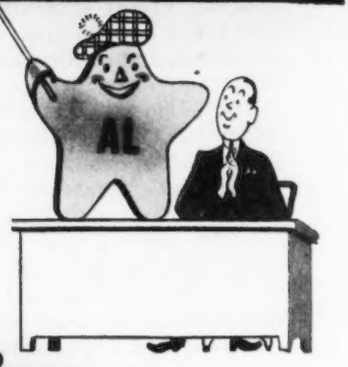
This week some steel sales people were already beyond the feeling-good-over-the-way-things-are-turning-out stage. A balanced condition has long been looked for. Now that it is almost upon the industry a lot of sales officials are afraid that the momentum of heavy output and a downward trend in overall demand will, together, pull down the steel rate before the end of this year. Such a frame of mind is still only a guess and is a flashback on past performance in steel.

THE actions of the steel scrap market this week have been anything but pleasant when viewed as a possible forecast of steel activity. Costwise the scrap price decline is welcome. But if it portends a drop in steel output then the outlook is not so good. Scrap price conditions are probably discounting the return to a normal steel market.

No. 1 heavy melting steel is down $2 a gross ton at Pittsburgh and $1 a ton at Philadelphia. This has reduced THE IRON AGE steel scrap composite price $1 a gross ton to $36.25 a gross ton. This is the lowest price since Mar. 4, 1947 when scrap prices were on their upward march.

Even the new low scrap prices are not enticing steelmakers into the market in a big way. Many are still out of the market. Others will not come in again until they pare their stockpiles further. The big chance some steel firms take is that they may cut their scrap stocks too much if an emergency should arise at a later date.

Since this is a time of guess, crises and new conditions, the last half of this year could be affected by labor troubles. A coal strike is a possibility. But most steel firms have enough coal to weather such a tieup. A steel strike would be another matter. It is not without the realm of probability. If labor demands are turned down cold and if it looks like a last ditch chance for steel labor to try for another round of wage increase or a liberal security package, things could happen.



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U. S. Ready to Prove it Can do Without Russian Manganese

Red Threat Aimed At Lifting U. S. Tool, Steel Embargo Seen Bound To Fail

o o o

By GEORGE F. SULLIVAN
Pittsburgh Regional Editor

o o o

Pittsburgh

• • • **The United States** can get along without Russian manganese ore and is prepared now to prove it. For more than a year government and industry have been preparing for a sudden cutoff in Soviet ore imports. The Reds want to trade what they think is a key position in ore for certain important materials which the United States is unwilling to ship them. They expect to lift the embargo by a fear campaign but they are going to be disappointed.

It is true that we obtained over a third of our total manganese imports from the USSR in 1948 and that a sharp drop could not be taken without some readjustments. It would be annoying but steel production will not suffer if we don't import another ton of Russian manganese.

What is the Russian game? The idea is to use the manganese ore shortage as a blackjack to get more American goods. They don't need the money; they have gold. They want machine tools and steel, including sheets and rails and reinforcing bars. The government has embargoed these and any similar products that could help build armaments.

A halt in manganese shipments has already been considered from both a cold war and a hot war viewpoint. Plans are already in operation to cover both eventualities. The possibility of a cutoff, weighed from either angle, is not alarming despite what our former allies would have us think.

In case of a shooting war the United States strategic stockpile is big enough to cushion a complete lack of Russian imports for at least 5 years. The Russian share of U. S. imports is estimated at about a third, considering imports for consumption rather than total imports. With no imports at all from any source the strategic stockpile would last about 2 years, according to published estimates. Actual figures are confidential.

In an emergency, U. S. reserves of low grade manganese ores could be brought into production with federal subsidies as they were during the last war. The following table shows the way manganese ore production was boosted in this country during World War II. Output of ore ranging from 5 to 10 pct Mn content is excluded. Figures are in gross tons:

	35 Pct	10-35 Pct
1940	27,158	320,006
1941	65,939	457,287
1942	158,898	237,199
1943	174,193	418,627
1944	215,330	265,162
1945	155,621	102,078

Manganese shipments from Russia, which were temporarily suspended during the war, increased sharply in the postwar period. These imports accelerated to 21 pct of the total in 1947 and 37 pct of the total in the last quarter of 1948. These abnormally high imports resulted partly from transportation difficulties in other parts

Cold War!

of the world and partly from eagerness on the part of Russia to sell manganese to the U. S. They tend to obscure the fact that we won World War II with no Russian manganese.

Supposing that the war stays "cold" and that we get little or no Russian manganese ore this year? This is a possibility no one in industry or government is overlooking. So far as could be learned by an IRON AGE check of several large importers, no 1949 Russian ore contracts have been signed. If this continues what are the prospects?

The overall prospect is of growing tightness in industry stocks of manganese ore. (The strategic stocks cannot be touched in peacetime without congressional approval.) This tightness will continue for perhaps a year, some say 6 months. We will then be importing substantially better tonnages from Africa and India. If the accelerated program of help to these and to other manganese producing areas is continued at its present rate we should be independent of Russian manganese within 2 years.

South Africa is getting the most attention for there the problem is mainly one of improving rail transport. This has a high priority. Shipments on the 4000 ore cars ordered for its mines are now running at four times the planned rate and a definite improvement will be obvious there in about 6 months.

Imports from India during the first quarter of 1949 will be about double the first 3 months of 1948 and a high export rate is anticipated for the rest of the year. Shipments have been sporadic because transport is poor. Last fall General MacArthur's headquarters boosted the f.o.b. price there and took 5 cargoes to Japan.

Government agencies such as ECA are working for development of other sources. The agency is pushing expansion of Gold Coast and Moroccan production. Though some of these ores are not the high grade required for stockpile specifications they can be used by industry by blending with higher grade ores.

Gains from Brazil may be slow in coming. At present the U. S. Steel Corp. mines there can supply at least a third of the corporation's requirements. More efficient operation by Central R.R. of Brazil could probably boost this by 50 pct.

Manganese ore mining is starting at a new point in Brazil, in the heart of the continent. This new development, at Matto Grosso (Big Swamp) may be 5 years in the making. It means a long haul down the Paraguay River to the coast or by rail across Brazil. Meanwhile U. S. Steel's Brazilian receipts are limited by the fact that the Volta Redonda Steel plant gets iron ore over the same line used to haul U. S. Steel's manganese ore.

The international manganese ore situation is not one for complacence, nor is it any cause for alarm. It means getting down and digging but since the eventualities were foreseen the spadework was done months ago.

The Munitions Board is not seriously disturbed about its present manganese stockpiling program although buying is behind schedule. It has no plans for stepping up the buying rate now.

The steps taken long ago by both government and industry have put this country in a relatively good position. It isn't as good as could be desired but it is far better than the Russians would have the general public think. Some U. S. ore buyers actually turned down Russian offers because the conditions did not suit U. S. policy. The next move, if Stalin wants dollars, is up to him.

Import and Consumption of Foreign Manganese Ore

Manganese (35 percent or more Mn) imported into the United States during the year 1948, in short tons[1]

COUNTRY	GENERAL IMPORTS[2]					
	BATTERY		OTHER		TOTAL	
	Gross Weight	Manganese Content	Gross Weight	Manganese Content	Gross Weight	Manganese Content
Angola			2,608	1,408	2,608	1,408
Belgian Congo	2,128	1,085	561	286	2,689	1,371
Brazil			143,916	57,955	143,916	57,955
Canada			348	176	348	176
Chile	672	336	10,171	4,537	10,843	4,873
Cuba	684	355	32,159	15,213	32,843	15,568
France			1	1	1	1
French Morocco			300	166	300	166
Gold Coast	68,053	38,376	64,918	31,930	132,971	70,306
India	1,707	796	211,738	102,420	213,445	103,216
Mexico	136	55	61,478	27,731	61,614	27,786
Philippines, Republic of	560	302	9,560	4,797	10,120	5,099
Portuguese Asia			1,109	455	1,109	455
Turkey			33	18	33	18
Union of South Africa			216,576	98,513	216,576	98,513
U. S. S. R.	8,950	4,923	418,280	196,488	427,230	201,411
Total	82,890	46,228	1,173,756	542,094	1,256,646	588,322

Manganese (35 percent or more Mn) imported into the United States during the year 1948, in short tons[1]

COUNTRY	IMPORTS FOR CONSUMPTION[3]					
	BATTERY		OTHER		TOTAL	
	Gross Weight	Manganese Content	Gross Weight	Manganese Content	Gross Weight	Manganese Content
Angola			1,630	880	1,630	880
Belgian Congo	2,128	1,085	560	286	2,688	1,371
British East Africa			530	281	530	281
Brazil			160,479	71,561	160,479	71,561
Cuba	684	355	32,158	15,284	32,842	15,639
Canada			349	177	349	177
Chile	672	336	9,631	4,591	10,303	4,927
France			1	1	1	1
French Morocco			300	166	300	166
Gold Coast	58,190	33,015	154,598	76,478	212,788	109,493
India	1,707	796	308,653	149,911	310,360	150,707
Mexico	136	55	53,659	23,852	53,795	23,907
Pakistan			855	424	855	424
Philippines, Republic of	560	302	9,560	4,798	10,120	5,100
Union of South Africa			283,376	130,114	283,376	130,114
U. S. S. R.	8,949	4,922	373,063	176,374	382,012	181,296
Total	73,026	40,866	1,389,402	655,178	1,462,428	696,044

1—According to the Bureau of the Census. (Source: U. S. Department of Interior.)
2—Comprises ore received in this country during year shown; part went into immediate consumption and the remainder entered bonded warehouses.
3—Comprises ore withdrawn from bonded warehouses, irrespective of the quarter of importation, and ore received in this country during year shown for immediate consumption.

Fairless Asks More Steel Consumers in Pittsburgh

Pittsburgh

• • • **"Regardless** of what may happen to basing points, Pittsburgh must enlarge its local steel consuming market," Benjamin F. Fairless, president U. S. Steel Corp., told the local chamber of commerce last week. He declared that "uncertainties arising from the basing point decision have provided steel fabricators with an added reason for considering the movement of their plants to steel producing centers."

"In 1901, when U. S. Steel was formed, its steel ingot capacity in the greater Pittsburgh district, including Youngstown and Johnstown, was about 6,900,000 net tons. Today its Pittsburgh district capacity totals roundly 13,500,000 tons, a gain over 1901 of 6,600,000 tons.

"In the same period U. S. Steel's total capacity rose from approximately 10,600,000 net tons to 31,300,000 tons, an increase of 20,700,000 tons. Our Pittsburgh capacity, it will be noted, has nearly doubled, but U. S. Steel's total capacity has virtually tripled.

"This means that greater gains have occurred in other districts than in the Pittsburgh area . . . Pittsburgh has lost ground because, with its relatively large capacity, it has had to reach farther for tonnage."

FPC Approves Construction Of Southwest Pipelines

Washington

• • • **Construction of new** natural gas pipeline facilities in the Southwest, requiring more than 250,000 tons of pipe, in order to conserve gas now being vented into the air has been approved by the Federal Power Commission.

The project will capture and carry 250 million cu ft of gas daily from the Permian Basin in New Mexico and Texas into central and northern California. It will cost El Paso Natural Gas Co. and the Pacific Gas & Electric Co. approximately $55 million each, including additional field lines and equipment.

This will involve construction by Pacific Gas of 506 miles of 34-in. pipe, the largest diameter ever authorized for a natural gas line. It will run from the California border to Milpitas, Calif.

Other portions include construction by El Paso of 247 miles of 26 and 30-in. line looping the present 26-in. line from the Permian Basin; 102 miles of 26-in. line; 95 miles of 24-in. line; and 17 miles of 30-in. line.

Work on the project is to begin immediately and, under the FPC order, must be completed by July 1, 1952.

Moves Local Branch

Buffalo

• • • **The U. S. Radiator** Corp. has moved its local branch facilities into a new one-story office and warehouse building at 1720 Military Rd. Previously products distributed here were stored in Dunkirk, N. Y., about 50 miles distant.

Hanna Declares Dividend

Cleveland

• • • **Directors** of The M. A. Hanna Co. have declared a dividend of 40¢ a share on common stock, payable Mar. 12 to stockholders of record at the close of business Mar. 3. The same amount was paid Mar. 12 last year.

The Bell Aircraft Corp. Increases Working Force

Buffalo

• • • **The Bell Aircraft** Corp. has increased its working force by 200 since December and will add approximately 800 more workers by July, bringing employment at its Wheatfield plant to 2800.

A spokesman said the $7,575,027 subcontract from the Boeing Airplane Co. for B-47 Stratojet bomber parts has been increased to $7,900,000. Preliminary production work on the order is getting under way and the contract is expected to continue well into next year.

Another large contract with Consolidated-Vultee for similar parts for the B-36 Consolidated bomber, virtually identical to those for the B-47 Boeing craft, is reported "probable" in aviation trade circles. This contract might be as large as the Boeing order, it was intimated. Bell officials refused comment on this probability, however.

Some of the additions to the Bell plant force, a spokesman said, were for the "normal seasonal increase" in production of the company's Prime Mover—the motorized materials handling device.

3-IN. CUPOLA: *W. M. Spradlin, melting supervisor, and Dr. Fred C. Barbour, chief chemist, of McWane Cast Iron Pipe Co., Birmingham, are tapping a heat from a 3-in. cupola furnace of which they are co-builders. Heat takes two min, yields two pounds of iron. Capacity is rated at .03 of a ton per hr. Builders describe the furnace as an exact scale model, except the stack is one-eighth in. too short.*

Industrial Briefs . . .

• GOLDEN ANNIVERSARY — Schiavone-Bonomo Corp., Jersey City, N. J., has announced that they are celebrating their fiftieth anniversary in the scrap iron and steel industry this month.

• MOVES—The Pressed Metal Institute has announced that they have moved to 13210 Shaker Square in Cleveland.

• TO DIRECT RESEARCH—Frank T. Sisco, director of Alloys of Iron Research, has been appointed technical director of the Engineering Foundation. Mr. Sisco has been in charge of Alloys of Iron Research since 1930 and will continue this project in addition to his new duties at the Engineering Foundation.

• RECEIVES AWARD — The George Gorton Machine Co. of Racine, Wis., has received the 1948 Labor Relations Institute first place award for outstanding achievement in industrial relations. It was said that this was the first such an award made by the institute.

• JOINS STAFF—H. B. Goodwin has joined the staff of Battelle Institute, Columbus, Ohio, where he will be engaged in research in metallurgy. Mr. Goodwin has previously been associated with the Bethlehem Steel Co., the Crown Cork & Seal Co. and the Kellex Corp.

• CHANGE OF ADDRESS—Kennametal Inc., Latrobe, Pa., manufacturers of cemented carbide products, has moved its New York office to 11 W. 42nd St. L. D. Morton is acting manager of this office.

• REPRESENTATIVES — Illinois Tool Works, Chicago, has announced the appointment of Tools, Inc., 4427 Germantown Ave., Philadelphia, as exclusive representatives in the Philadelphia area for their standard and special metal cutting tools, gear measuring machines and die filing machines.

• PAINTING ON METAL—"The Altar of Steel," a mural painting on stainless steel by Buell Mullen, is being exhibited at the Architectural League of New York in New York City until Mar. 12. Also on exhibition are original charcoal sketches and other ideas for stainless steel, aluminum and gold.

• NEW COMPANY—Lea Mfg. Co. of Canada, Ltd., 370 Victoria St., Toronto, has been formed to manufacture and distribute an extensive line of polishing, buffing and burring compositions. Everything is made under the guidance of the Lea Mfg. Co. of Waterbury, Conn. Officers are: Dr. Henry L. Kellner, president; Earle W. Couch, vice-president; and Kergan Wells, secretary and general manager.

• ELECTS OFFICERS—D. R. Simmons of the Elberta Crate & Box Co., Bainbridge, Ga., has been reelected president of the Wirebound Box Manufacturers Assn. John R. Miller of the T. R. Miller Mill Co., Inc., Brewton, Ala., was named vice-president.

• ADDS TWO FURNACES—Installation of two additional Ajax-Northrup high frequency induction melting furnaces at a cost of approximately $60,000 has been announced by the Cooper Alloy Foundry Co., Hillside, N. J. The melting capacity at the Cooper Alloy foundry, devoted exclusively to the casting of stainless steel, now exceeds 1 million lb per month.

• NAMES OFFICIALS—A. F. Anjeskey, sales manager of the Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio, has been elected president of the Monorail Manufacturers' Assn. Wilbur Mayer, sales manager of the Louden Machinery Co., Fairfield, Iowa, was named vice-president, and E. Donald Tolles was elected secretary-treasurer.

Makes Tungsten Powders With Predictable Size

Towanda, Pa.

• • • **Commercial production** of fine tungsten powders, with precise and predictable particle size and distribution for the critical requirements of tungsten carbide tool makers, has been achieved by the Tungsten and Chemical Div. of Sylvania Electric Products Inc. here, according to John B. Merrill, division manager.

Mr. Merrill declared the new control method makes it possible to supply material to meet tool makers exact specifications without varying their processing.

"Importance of particle size and distribution has hitherto been first in the minds of cemented tungsten carbide tool makers. Now our ability to produce and reproduce tungsten powder with known and predictable physical characteristics has focussed attention on the other materials used, carbon and cobalt."

Albion Buys Foundry

Washington

• • • **The government-owned** steel foundry at Albion, Mich., has been sold to its wartime operator, the Albion Malleable Iron Co., for $350,000. It originally cost about $1.8 million.

It has been operated since the war by the Albion firm under an interim lease expiring as of 1952. The wartime capacity was about 25,000 tons of malleable iron castings for heavy army trucks.

During the interim lease since the war, Albion has spent substantial sums on reconversion and plans to spend $450,000 additional for improving and replacing present equipment.

Gets Clean Bill of Health

Cleveland

• • • **Gray Iron Founders' Society** received a clean bill of health following a 2 weeks' investigation of its activities by the U. S. Dept. of Justice, according to GIFS announcement. All society files were made available for scrutiny by the corps of investigators who removed 992 documents for further reference, all of which were returned.

Most of the $5 Billion ERP Funds For First 15 Months Allocated

Washington

• • • **Nearly all** the $5 billion appropriation for the first 15 months of the European Recovery Program has been allocated. But less than half of the industrial goods so assigned has actually left American shores in 11 months.

Completed tabulations through Dec. 31, first 9 months of the Economic Cooperation Administration program, show total authorizations of $1.9 billion for industrial goods of all types. Slightly more than half consisted of iron and steel, nonferrous metals, machinery and other lines directly affecting the metalworking industry.

As of the same date, a total of $784 million in industrial goods had been reported as shipped—approximately 41 pct. For some goods, such as machinery and heavy equipment, actual shipments fell as low as 1 pct of the authorizations.

For selected industrial goods (see table) which directly involve the metal industries, shipments for the 9 months approximated $240 million or about 25 pct of the total of $925 million in authorized purchases.

Reasons for the lagging shipments are not hard to find. One reason is that authorizations are one thing while actual buying and delivery is another.

The ECA does no buying, no shipping. After the agency has approved quantities and sources, the individual nations must carry out their purchasing negotiations through regular trade channels—which may be a matter of weeks, even months.

Another reason is that industrial authorizations got off to a slow start while immediate needs in the way of food and grain for planting, etc., were taken care of. Also, actual shipping totals are somewhat higher than those reported because of the lag in gathering and forwarding to ECA of invoices.

But Less Than Half Assigned Goods Have Been Shipped From This Country

o o o

Bulk of the allocations for several of the industrial materials shown in the table must be supplied by the United States. Of the $925 million worth authorized to date, more than $625 worth are to be bought from American suppliers.

Neither the buying nor shipping ratios hold true across the board, however. A high percentage of the machinery, farming and industrial equipment must be supplied by the United States alone. Other nations will supply the bulk of nonferrous metals and ores and concentrates.

Construction and mining machinery and equipment are concrete examples. American suppliers will furnish all but $900,000 worth of the $61 million worth authorized. Little has been shipped except to England.

Likewise, all but $100,000 worth of the authorized machine tool orders have gone or will go to the United States manufacturers. About $600,000 worth had been reported as shipped on Jan. 1.

On the other hand, the domestic supply is affected only slightly by aluminum purchases. Canada is supplying the bulk of the white

ECA SELECTED AUTHORIZATIONS AND REPORTED SHIPMENTS, BY COMMODITY AND MAJOR DESTINATIONS, THROUGH DEC. 31

(In millions of dollars and shipments listed in parenthesis)

COMMODITY	U. K.	France	Italy	Netherlands	Bizone	Australia	Other	Total	From U. S.
Iron and Steel Mill Products:	7.8	20.0	13.5	21.3	8.2	2.9	24.6	98.3	(79.7)
Primary	(2.9)	(2.4)	(1.3)	(4.7)	(....)	(.8)	(2.7)	(14.8)	(....)
Advanced	(1.9)	(1.1)	(....)	(1.4)	(....)	(....)	(.1)	(4.5)	(....)
Unclassified	(2.8)	(1.6)	(....)	(.1)	(....)	(....)	(.1)	(4.6)	(....)
Nonferrous and Products:									
Copper	49.9	37.3	13.0	7.8	7.7	1.8	4.7	122.2	(34.1)
	(40.6)	(20.8)	(3.3)	(1.6)	(.3)	(.3)	(.1)	(67.0)	....
Aluminum	43.0	1.4	....	2.4	....	....	2.8	49.4	(.4)
	(31.0)	(.2)	(....)	(....)	(....)	(....)	(.2)	(31.4)	....
Lead	23.6	7.2	....	3.2	.8	.7	2.4	37.9	(2.2)
	(14.7)	(2.7)	(....)	(.7)	(....)	(.1)	(.2)	(18.4)	....
Zinc	27.0	3.8	....	2.0	3.1	.6	.5	30.0	(14.2)
	(21.9)	(3.2)	(....)	(.1)	(.1)	(.1)	(.2)	(25.6)	....
Ores and Concentrates	24.8	8.7	.1	1.7	4.0	....	1.0	40.3	(4.4)
	(.5)	(2.1)	(....)	(....)	(....)	(....)	(4.5)	(7.1)	....
Machinery, Vehicles:									
Construction, Mining	13.4	24.0	11.9	2.0	4.5	1.8	3.3	60.9	(60.0)
	(7.4)	(2.8)	(....)	(.1)	(....)	(.3)	(.1)	(10.7)	(....)
Metalworking	18.0	10.9	8.6	3.0	....	5.4	4.9	50.8	(50.3)
	(....)	(2.8)	(....)	(....)	(....)	(....)	(.1)	(2.9)	....
Machine Tools	10.6	6.8	3.7	3.0	....	2.6	3.4	30.1	(30.0)
	(....)	(.3)	(....)	(.3)	(....)	(....)	(....)	(.6)	....
Agricultural	5.2	12.9	.2	4.4	....	.1	6.3	29.1	(21.8)
	(....)	(1.3)	(....)	(.1)	(....)	(....)	(....)	(1.4)	....
Tractors	10.0	16.6	.2	4.7	....	.1	4.5	36.1	(34.5)
	(....)	(6.3)	(....)	(....)	(....)	(....)	(.1)	(6.4)	....
Industrial (n.e.c.)	55.2	18.6	43.5	13.4	1.4	2.9	17.2	156.8	(152.3)
	(....)	(2.6)	(.1)	(.7)	(....)	(....)	(2.4)	(5.8)	....
Motor vehicles, parts, accessories	2.9	7.7	.3	25.8	4.0	.3	36.7	77.7	(76.3)
	(....)	(.4)	(....)	(1.9)	(.9)	(....)	(14.8)	(18.0)	....
Aircraft parts, access.	....	12.1	5.5	10.0	....	....	5.9	33.5	(33.0)
	(....)	(1.2)	(....)	(3.2)	(....)	(....)	(1.6)	(6.0)	....
Other Transportation	.7	32.9	.3	.4	28.6	.4	3.4	66.7	(31.2)
	(....)	(11.2)	(.1)	(.2)	(.6)	(....)	(1.3)	(13.4)	....

The above table, compiled from cumulative ECA reports through Dec. 31, gives (in plain type) the amounts of procurement authorized and (in parenthesis beneath) the reported shipments. In the final column is given (also in parenthesis) the amount of materials to be purchased in the United States. It is to be pointed out that there is a lag in reported shipments, due to the routine and sometimes delay in forwarding invoices to ECA after placing goods aboard ship. Also, vast quantities of office machinery and equipment is included in "industrial, n.e.c." classification.

metal. A major portion of authorizations for ores and concentrates are approved for Latin America and other suppliers outside the United States.

Nor do overall percentages apply to destinations. England, for instance, has been largely successful in getting orders placed and the goods laid down at the ports in the case of such goods as iron and steel mill products, mining machinery, and ores and concentrates. While British allocations are relatively small, the U. K. has received nearly all its requested $8 million worth as against 23 pct shipment of the $100 million worth authorized for all nations.

Likewise, France has been making good progress in getting shipments made although not so successful as the British. Shipments to Netherlands are also getting under way.

Changes Furnace Setup

Pittsburgh

• • • **The board of directors** of Koppers Co., has approved a plan to dissolve Missouri-Illinois Furnaces, Inc., a wholly-owned subsidiary, and assume its property, liabilities, and obligations. The subsidiary owns two blast furnaces and a coke plant at Granite City, Ill. This plant has been operated by Koppers as agent for Missouri-Illinois.

Gen. Brehon Somervell, Koppers president, said that the dissolution of the subsidiary "is in line with the company's policy of simplifying its corporate structure." The Granite City plant will be known in the future as the Missouri-Illinois plant of the Company's Gas and Coke Div.

Planning Furnace Repairs

Buffalo

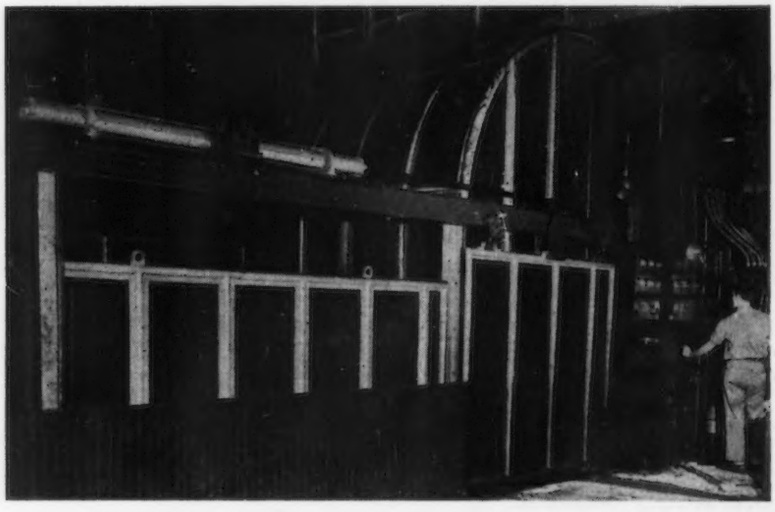
• • • **Tonawanda Iron Corp.,** subsidiary of American Radiator & Standard Sanitary Corp., plans to shut down its blast furnace for extensive repairs early in April. Relining and other work will take about 60 days. The furnace was last relined in the Spring of 1943.

Vermont Employment Down

Boston

• • • **Employment in** the state of Vermont was 10 pct less in January 1949 than it was in January 1948 and 17 pct less than it was in the corresponding month in 1947, the State Unemployment Compensation has announced. Unemployment compensation payments to approximately 3000 persons during the month totaled $167,000, an increase of 42 pct over December and 79 pct over January of last year.

MOUSETRAP: *Safety cages have become a must at the discharge end of high speed cold reduction mills. This one on Weirton Steel's "mile a minute" mill features a pneumatically operated door, has been used successfully since May 1, 1948. Weirton workers call it "the mousetrap," believe theirs was the first of its type ever installed.*



Experimental Pelletizing Of Concentrates to Start

Cleveland

• • • **Production of pellets** from magnetic taconite concentrates at Reserve Mining Co.'s Ashland, Ky., plant will probably start some time this month. Reserve Mining Co. is managed and operated by Oglebay, Norton & Co., for Armco Steel Corp., Wheeling Steel Corp. and Montreal Mining Co. Initial work at the plant is primarily experimental in nature.

Present beneficiation equipment can concentrate magnetic taconite so finely that it is difficult to sinter. Proponents of pelletizing believe that eventually magnetic taconite concentrates can be pelletized at 60 to 70 pct of the cost of sintering. Present experiments will provide the answers.

Construction and operation of magnetic taconite beneficiating plants is at a temporary stalemate. Planning is about completed for Reserve Mining Co.'s full-scale plant at Beaver Bay, near the Lake Superior shore line.

Erie Mining Co.'s big pilot plant, at Aurora, Minn., is not in production at the present time. Erie Mining Co. is managed by Pickands, Mather & Co. for PM, Youngstown Sheet & Tube Co., Bethlehem Steel Co. and Interlake Iron Corp. This plant is expected to provide some of the answers to economic feasibility of large-scale magnetic taconite beneficiation.

Public Hearings Slated On Voluntary Allocation

Washington

• • • **Public hearings** will be held on Friday, Mar. 11, by the Office of Industry Cooperation concerning proposed voluntary allocations of 161,870 tons of steel to ECA nations and 83,618 tons for federal reclamation projects.

These are followed on Monday, Mar. 14, by hearings concerning allocations of 79,200 tons for warm air furnaces and 2850 tons for baseboard radiation. All four proposals have been okayed by the Steel Products Advisory Committee.

Most of the reclamation projects are in the Pacific and Northwest states but some steel would

be channeled to work in various states of the Missouri and Rio Grande river basins.

As approved by the Committee, shipments for reclamation purposes would approximate 30,515 tons of bars, 26,270 tons of shapes, 17,750 tons of plates, 2875 tons of hot rolled sheet, 2525 tons of silicon laminated sheet, 1263 tons of wire and rod, 1100 tons of hot rolled strip, 1010 tons of pipe plus 400 tons of conduit tubing, and 900 tons of rails and accessories.

Heaviest monthly requirements would be for May with 23,000 tons with requirements of about 16,000 tons each for June and July. Needs for the remaining 2 months are set at about 13,000 tons each.

Requirements for baseboard radiation involve 890 tons of cold rolled sheet and strip and 60 tons of 1-in. and 1½-in. pipe for each of the 3 months of the program.

Reports Employment High

Boston

• • • **Bethlehem Steel Co.'s** Quincy yard has 8200 on its payroll, the largest number for any peace year in its history.

It has on order two 28,000 ton super-tankers for the Texas Co., two passenger vessels for American Export Lines with accommodation for approximately 1000 passengers each; and two destroyers for the Navy. In addition, it is putting finishing touches on a cruiser similar to the one launched at the yard Nov. 15. The aggregate value of work on hand runs to some $150 million.

Yard improvements include steel sub-assembly and storage area with welding platens and tower crane services in process of construction.

Budd Co. Sets Record

Philadelphia

• • • **For the second** month in succession, Budd Co. has broken all previous production records. Fitzwilliam Sargent, vice-president in charge of railway sales, said that the Company had built and delivered 28 railway passenger cars during 20 working days in February. In January the Company completed 26 railway cars.

U. S. Scrap Authorities Tell Germans Long Term Outlook for Scrap Is Still Bleak

Berlin

• • • **United States** scrap authorities here insist that easiness in U. S. domestic scrap prices does not mean that there is no need for long term scrap supplies. It is being pointed out that the price declines there have been a correction based on (1) a better supply, (2) a withdrawal of gray marketeers from the market and (3) a general tendency for some steel users to throw overboard conversion deals.

P. M. Reinartz, scrap coordinator (U. S.) in Germany who, from his long experience in steelmaking, offers the strong suggestion that the easiness in scrap prices in the United States should not be taken as proof that steelmaking metallics are in oversupply. Nothing could be farther from the truth, according to Mr. Reinartz.

The current situation may mean that steel firms have ample supplies, that prices are going through a corrective stage and that the leveling off of quotations may reflect a back-to-normal steel market. But for the long pull there will always be a need for more and more scrap.

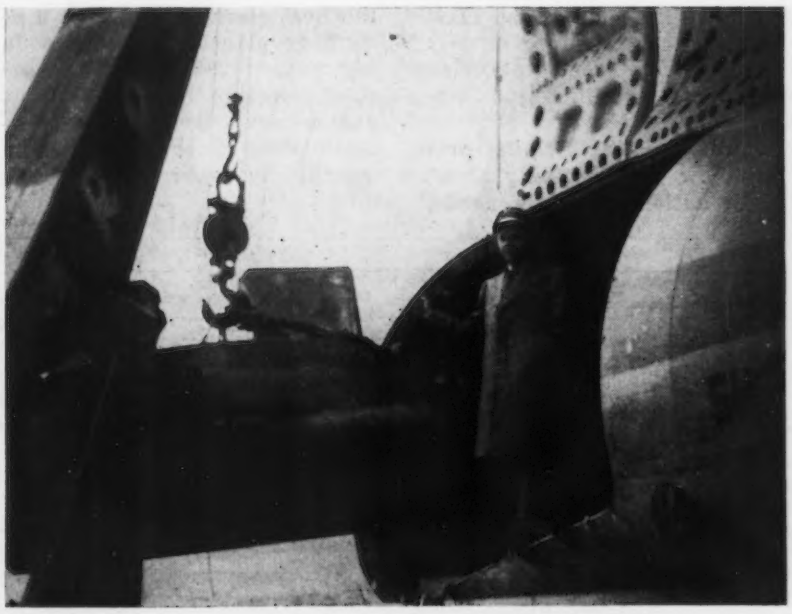
Supplies were badly depleted during and after the war. Regular established United States scrap buyers, Mr. Reinartz says, have had their hands full getting material out of Germany because of export mechanics and because of other confusing conditions — part of which have been inexperience and speculative competition. The job has been no pushover but the scrap moving to the United States shows the results of hard work over here.

To Resume Operations

Buffalo

• • • **The East Buffalo** car shops of the New York Central R.R. will resume operations shortly after a shutdown of more than a month. About 650 of the approximately 750 employees will be recalled, according to present plans, a spokesman said.

HEAVY SPECIAL: *An 11,640-lb slabbing mill spindle is loaded aboard a C-46 at Pittsburgh airport bound for Geneva, Utah, where a breakdown in the U. S. Steel plant halted slabbing operations. The part is believed among the heaviest items ever shipped by air. It was produced at Homestead Works of Carnegie Illinois, where it was stocked as a spare and started on its way within 24 hr of the Geneva breakdown.*



Belgium to Purchase American Machinery To Increase Output

Washington

• • • **The way has** now been cleared for Belgium to purchase American-made industrial machinery and equipment for expansion and modernization of that nation's steel capacity.

A $40-million program has been made possible by a $17 million loan to Belgium by the International Bank for Reconstruction and Development. It includes construction of a new rolling mill, a blooming mill, and a supporting power project.

Some $4.5 million of the loan will be turned over to S. A. John Cockerill, oldest and largest of Belgian steel plants. This will be matched with $5.3 million in Belgian money for construction of rolling and tinplate facilities for its recently created subsidiary—Compagnie des Fers Blancs et Toles a Froid (Ferblatil).

Another $5.8 million of the loan will be expended on blooming mill and related equipment for new facilities for S. A. d'Ougree Marihaye, second largest Belgian steel firm. This sum will be supplemented by $4 million in Belgian funds.

Purpose of the new facilities is not so much the overall expansion of steel facilities of Belgium as to continue a program of modernization and equalization of production, it is explained. Belgian blast furnace capacity is approximately the same as raw steel production—each about 4 million tons annually.

However, existing Belgian production now provides only about half the nation's tinplate needs. Consequently, Belgium has been an importer of tinplate. The proposed new Ferblatil facilities are expected to turn out about 60,000 tons anually, producing an excess of 20,000 tons for export purposes.

Installation of the blooming mill and eight overhead cranes is counted on to greatly increase efficiency and reduce costs by enabling the firm to make wider use of existent facilities. This will strengthen the Belgian position competitively, particularly in the export market.

The remainder of the loan is to be spent on equipment which will be imported for the construction of a central power station having an overall cost of $21 million. Both the Ferblatil and Ougree mills will obtain power from this generating plant which will be operated by Linalux.

Reports Employment Down

Providence, R. I.

• • • **Rhode Island** industrial employment declined 2.7 pct in January from December. It was the fifth successive month that employment had fallen from the preceding month. Total employment at the end of January was 116,949, the state labor department reported. In the past year 18,153 jobs disappeared.

Monthly Output Hits Peak

Buffalo

• • • **The Lackawanna** works of the Bethlehem Steel Co. set a new monthly plant record by producing nearly 295,000 net tons of steel ingots in January. The output bettered the previous mark, established in the preceding month, by approximately 2000 tons.

Carboloy Tool Control Plan Hits High Costs

Detroit

• • • **Citing as an** example of a new plan of "Coordinated Carbide Control," a fancy title for efficient tool inventories, the Carboloy Co., pointed out that one midwestern engine plant reduced its tool and fixture inventory from $3 million to $700,000. The program of tool control, not necessarily restricted to carbide tools, is part of Carboloy's effort to assist manufacturers in metalworking plants to achieve lowered costs.

A definite plan of action has been worked out by Carboloy engineers to attack high costs in machine and operator idle time during tool changes, tool maintenance, large tool inventories, and other phases. It is pointed out that some items of cost that substantially effect breakeven points are, in addition to those mentioned, high initial costs of tools because of the lack of tool standardization, loss of production caused by improper tooling and low machine speeds and feeds, excessive scrap, low machine efficiency, and insufficient training of tool supervisors and tool grinders.

Through the Carboloy tool control plan, such cost items are subject to reduction. To make this possible, Carboloy has developed, tested in various plants and is making available to metalworking plants a number of aids. These include a manual of tested cost reducing tool control systems and practices, with examples of their application in different types of metalworking plants; a training course for in-plant training of personnel; and a tool manual dealing with phases of tooling.

AMERICAN IRON AND STEEL INSTITUTE
350 Fifth Avenue, New York 1, N. Y.

Blast Furnace Capacity and Production—Net Tons

JANUARY - 1949 (Month)

	Number of companies	Annual blast furnace capacity	Production: Pig Iron — Current month	Pig Iron — Year to date	Ferro Manganese and Spiegel — Current Month	Ferro Manganese and Spiegel — Year to date	Total — Current month	Total — Year to date	Percent of capacity — Current month	Percent of capacity — Year to date
DISTRIBUTION BY DISTRICTS:										
Eastern	12	13,353,580	1,103,952		34,502		1,138,454		100.3	
Pittsburgh-Youngstown	17	26,625,920	2,131,438		20,753		2,152,191		95.1	
Cleveland-Detroit	6	6,984,600	589,100		-		589,100		99.3	
Chicago	7	15,655,390	1,180,036		-		1,180,036		88.7	
Southern	8	5,010,060	425,061		7,560		432,621		101.6	
Western	4	2,912,300	232,437		-		232,437		93.9	
TOTAL	36	70,541,850	5,662,024		62,815		5,724,839		95.5	

Screw Machine People Expect 1949 Business To Decrease Slightly

Cleveland

• • • **A poll of screw** machine products manufacturers in eight states on the 1949 business outlook resulted in a composite guess of minus 8.8 pct from 1948, providing there are no price changes, according to Orrin B. Werntz, executive secretary, National Screw Machine Products Assn.

Mr. Werntz pointed out that the results of the NSMPA poll of member companies is not greatly different from the national economic experts' prognostication of minus 10 pct.

Companies participating in the poll are located in Connecticut, Massachusetts, Illinois, Wisconsin, New York, Michigan and Ohio and California.

According to Mr. Werntz, 65 pct of the participating companies guessed that business would be down; 20 pct that it would be up; and 15 pct anticipated no change. Companies anticipating a drop in business estimated minus 16 pct; those who anticipated greater volume estimated plus 13 pct.

The most optimistic was the western New York district which stated that business would be up 4 pct. The most pessimistic were New England members, who came up with a minus 14 pct average.

The poll was made immediately after the NSMPA reported a falling off of new business in December of 20 pct from 1948 levels with very little recovery in January.

Mr. Werntz said that despite this fact, the association members were relatively optimistic for the balance of the year, although when questioned verbally, they were far more pessimistic as to sales and earning outlook than when they placed their prognostications on paper.

Opens Buffalo Warehouse

Buffalo

• • • **U. S. Plywood** Corp. has opened a warehouse at 300 Green St. The Buffalo market formerly was served by the company's Rochester warehouse. M. Thornley Young, formerly with the Rochester unit, has been named manager of the local warehouse.

New Parts Center Speeds Diesel Repairs

LaGrange, Ill.

• • • **Electro-Motive's** new diesel locomotive parts center is now in full operation. The ever expanding use of diesel locomotives by American Railroads has been an increasing demand for replacement parts. From the LaGrange center parts will flow to six other strategically located Electro-Motive parts distribution centers across the nation.

The new building containing 155,000 sq ft of floor space is adjacent to the main Electro-Motive production facilities. Layout of each section with wide aisles throughout the building permits the mechanized handling of parts. Advanced methods of store keeping and scientific packaging have been combined to insure rapid movement of parts both in and out of the center.

A bank of accounting machines prepares orders in a matter of minutes and makes them ready for processing. Pneumatic tubes convey orders from the machines to the clerk's headquarters in the adjoining warehouse section for immediate action.

To provide easy handling of shipments a rail spur accommodates loading and unloading of five box cars at one time. Loading platforms are at the box car floor level. Overhead electrical cranes are capable of moving heavy assemblies and loading docks are available to accommodate highway trucks. The new LaGrange headquarters is but one of the seven parts centers which help provide the railroads with nearby reserves of parts. The others are located in Jacksonville, Fla.; Halethorpe, Md.; Los Angeles and Emeryville, Calif.; St. Louis; and Minneapolis. About 30,000 current parts are distributed between these points.

When diesel locomotives break down or have accidents in service, the railroads want the parts in a hurry. Electro-Motive's parts centers were set up to meet such demands. Last July the lead unit of a Pennsylvania diesel unit collided with an auto in Columbus, Ohio. The LaGrange parts center was advised the Pennsylvania would need some parts in a hurry and arrangements were made for Electro-Motive personnel to be available to receive the Pennsylvania order any time that night.

At 8 pm the same day, the local storekeeper of the Pennsylvania Railroad phoned in an order for 53 pieces necessary to put the locomotive back in operating condition. These parts were delivered the next morning at 11 am by truck to the Pennsylvania freight depot in Chicago and were received in Columbus the same day.

Sees Future of Ore In Canada Closely Linked With Costs

Toronto

• • • **George Elwyn,** vice-president and treasurer of the Steel Co. of Canada, Ltd., stated that the great market for iron ore from the Labrador and New Quebec fields will be along the eastern seaboard of the United States, where steel mills already are in operation. He expressed the opinion that the large and high-grade deposits will not immediately affect Canadian steel economy.

"On the basis of costs of delivery, low-grade iron from the Mesabi may prove more economical in use than higher grades from Labrador," he stated. He added, however, that if shipping costs can be pared, Labrador iron may be used in Canadian steel manufacture.

The bulk of ore now being used in Eastern Canadian steel manufacture comes from the Mesabi range. Experts have recently predicted that the supply of high-grade ore soon will be exhausted. However, they estimate that sufficient low-grade ore remains to continue operation of the mines for at least 50 years.

Surveys are presently being made to determine transportation routes from Labrador along waterways to the Great Lakes, and thence to inland steel-producing plants.

Mr. Elwyn predicted no great expansion of the Canadian steel industry during 1949. He stated that, while no new plants were being planned generally by the industry, more modern processes were being installed to boost steel production.

Snyder Tool Buys

Detroit

• • • **Snyder Tool & Engineering Co.,** pioneer builders of specialized machines for the automotive and other mass production industries has purchased Arthur Colton Co., Detroit, builder of production machines for the drug, plastics and packaging industries. The purchase price was not announced.

According to Howard N. Maynard, president of Snyder, Colton manufacturing operations are being transferred to the Snyder plant. A new subsidiary, Arthur Colton Div., will be organized to market the diversified group of more than 100 pharmaceutical manufacturing and packaging machines developed by the Arthur Colton Co.

Among the highly-specialized Colton machines are automatic pill-rolling machines, capsule machines, tube-filling and closing machines and automatic cartoning machines. The new company will also continue the production of tablet-forming punches and dies and other pharmaceutical equipment.

Snyder Tool & Engineering Co. was founded here 25 years ago as a 12-man operation. Today more than 200 workers are employed in its modern plant. Clarence Snyder, founder of the company, is chairman of the board.

Coming Events

Apr.	4- 6	**American Gas Assn.,** distribution, motor vehicle and corrosion conference, Cincinnati.
Apr.	5- 6	**Metal Powder Assn.,** annual meeting, Chicago.
Apr.	8- 9	**Lead Industries Assn.,** annual meeting, Chicago.
Apr.	11-12	**American Machine Tool Distributors' Assn.,** spring meeting, Savannah, Ga.
Apr.	11-12	**American Zinc Institute,** annual meeting, St. Louis.
Apr.	11-14	**National Assn. of Corrosion Engineers,** annual conference and exhibition, Cincinnati.
Apr.	11-15	**Western Metal Congress and Exposition,** Los Angeles.
Apr.	18-20	**Midwest Power Conference,** Chicago.
Apr.	18-20	**American Institute of Mining & Metallurgical Engineers,** annual conference of Openhearth Steel Committee, Chicago.
Apr.	19-20	**Magnesium Assn.,** annual meeting, Chicago.

Young Asks Higher Rates; Admits Trucking Inroads

Washington

• • • **Charging that** the government is keeping railroads on starvation rates at a time when it is subsidizing truck and other transportation, Robert R. Young, board chairman of the Chesapeake & Ohio R.R., said here last week that unless something is done quickly, the "effect of railroad poverty will soon be felt even in the steel industry."

He made the statement to the press on the day that the Interstate Commerce Commission began hearings on the application for additional freight rate increases by the railroads.

In general, the roads are seeking to have an increase of 13 pct in most rates substituted for the 5 pct granted by the ICC in January.

Admittedly, trucking is cutting into steel and other freight transport. But Mr. Young denied that truck competition was forcing the demand for new rate increases. Not more than a third of railroad freight could possibly be diverted to trucks, he said, and the present increase is sought because costs have risen twice as much as rates, making existing rates inequitable.

Invests in British Plant

Washington

• • • **An investment** of a substantial minority interest amounting to $400,000 in a British drill chuck factory at Sheffield, England, has been guaranteed by the Export-Import Bank, acting for the Economic Cooperation Administration.

The investor is the Jacobs Mfg. Co., of Hartford, which will contribute cash, American tooling, and engineering knowledge. The New England firm has long been a British supplier and its support will enable the Sheffield plant to begin deliveries this spring.

No rated or estimated capacity figures were available here. However, the British have been importing several hundred thousand dollars' worth of chucks and it is expected by ECA that when full production is under way, there will be a surplus for export.

Record Year Seen for Pig Iron If Demand Continues Strong

Raw Materials Problem Being Overcome To Raise Iron Yield Per Furnace

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Pittsburgh

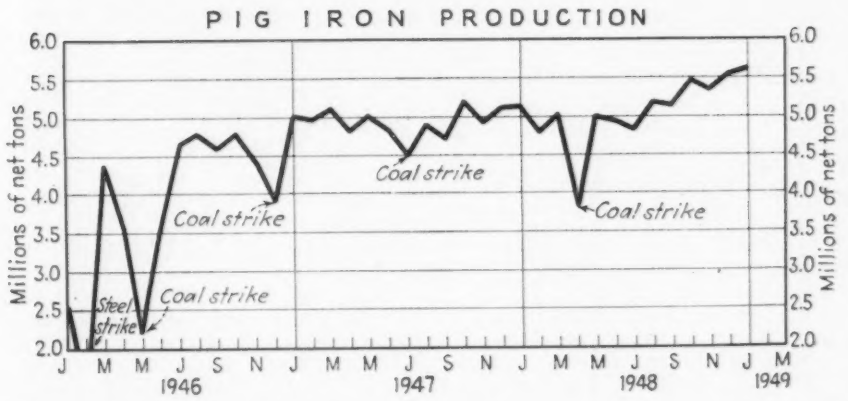
• • • **This will be** a record year for pig iron production if demand remains as strong as it is now. There are more furnaces in blast than ever before, average yield is higher and raw materials quality is steadily improving. Most operators are back on a normal relining schedule after the dislocation caused by the war. However, some repair and rebuilding programs have not recovered from postponements and patchings during the war and it may be some years before they do.

The outlook for production during the rest of this year is good, barring strikes. There are no major raw materials obstacles in sight. Ore could be a problem at current consumption rates but it can be licked in two ways: (1) An earlier start on lake shipping; or (2) rail movement. A third possibility is out of steel company control: A decline in demand could wipe out the indicated shortage of lake ore shipping capacity.

Coal—and hence coke—quality should improve steadily this year for three reasons: (1) New coal washing plants; (2) more operating experience with recently installed washers; and (3) better quality commercial coal.

The overall drop in coal demand has been an important factor in higher iron output. Steel company coal buyers have become selective. They have bypassed the strip miners and others who don't produce good coking coals. They buy only from the larger mines that have good washing equipment and ship uniformly good coking coal.

Ore improvement is a long term proposition. It will come from imported ores of higher Fe content than present direct-shipping Mesabi ores. And it is coming from beneficiation of lower grade domestic ores.



Pig Iron production climbs into new high ground. The chart shows production by months, in millions of net tons.

Operating practice is also improving output. Though coke quality is not up to that obtained before the war with selective mining it has improved in the past 2 years and it is becoming more uniform. Lack of uniformity in ash and sulfur content of blast furnace coke has been one of the big obstacles to more iron output during the last few years. High top pressures have already shown their possibilities for improving production of some existing furnaces by as much as 20 pct. The possibilities for raising output by use of low purity commercial oxygen are still being explored.

It adds up to this: Within a matter of years blast furnace operators are going to be able to get 20 to 25 pct more iron from existing facilities than they could a few years ago. This does not mean no more blast furnaces will be built. Five new furnaces were brought in during 1948, (one a small 27,000-ton a year unit) and several were reconditioned and revived. Kaiser is now building a new furnace at Fontana. Furnaces will still be built to replace obsolete units. And they will be built in cases where a substantial increase in pig iron is needed. But many furnace operators, foreseeing a need for 10 to 20 pct more iron within a few years, are likely to plan on getting it by technical or raw material gains alone.

Even the short term gain from relined furnaces and better coke is obvious. The same facilities are now producing anywhere from 5 to 15 pct more iron than they did last summer. Of course, last summer was bad. Coal stocks were built up in a mad scramble for anything black. Although many steel company coal piles still contain a lot of these cats and dogs, purchase of better quality commercial coals has boosted coke quality. Meanwhile the low grade coals are being worked off in homeopathic doses. Another mine strike this year would force their use in higher proportions and repeat last summer's problems.

Outstanding among the gains from good operating technique is the record recently set by Bethlehem's "H" furnace at Sparrows Point, Md. This 28-ft hearth furnace was rated at 540,000 net tons a year (or 45,000 tons a month) when it was installed in 1947. Yet it has produced over 54,000 tons in a single month! The ore charged is a 58 pct Fe content Chilean hematite. Because it is a coarse ore there is less tendency for fines to blow out the top of the furnace with consequent loss in iron production. In effect it

does what the high top pressure blowing technique is designed to do. Once considered none too desirable, operating experience and ingenuity have shown that this ore can be used very successfully.

The potential gains from beneficiated ore are important. Just as Jones & Laughlin and Republic are beneficiating Adirondack ores, so must the country's taconite ores be beneficiated. There is no choice about beneficiating—it has to be done to make the ore practical to use. But as a result blast furnace men expect the denser product to increase their average iron yield.

A 3-month test at Edgar Thompson Works of Carnegie-Illinois showed the production increases that might be expected from screened and sintered ores. A burden using about 80 pct coarse screened ore and 20 pct sintered fines yielded 21.2 pct more iron than one operating on 100 pct Mesabi ore. Average daily production rose from 1324 to 1605 tons.

Next on the horizon is the certainty that within a matter of years this country will be importing ore from Quebec-Labrador and Venezuela. Both these deposits run high in Fe content. A furnace rated at 400,000 tons a year based on a 50 pct Fe ore charge would yield about 480,000 tons of iron annually on a 60 pct Fe ore burden.

Copperweld Earnings Rise

Warren, Ohio

• • • **Copperweld Steel Co.** has reported peak income of $3,789,019 for 1948, equal to $7.21 a common share, compared with $1,546,711 or $2.85 a share for 1947. Last year's earnings, according to the company, were after provision of $1,200,000 for losses which may be incurred due to possible decline in inventory value and other contingencies. Without this provision, earnings would be equal to $9.54 a share.

ECA Authorizes Purchases

Washington

• • • **Procurement** authorizations were issued last week by the Economic Cooperation Administration for $2.5 million worth of American construction and mining equipment for French overseas territories. About $2.2 million worth of engine and turbine procurement were approved for the same areas.

At the same time, the French were authorized to purchase $2.3 million worth of motor vehicles, parts and accessories; $337,000 worth of metal working machinery; and $135,000 worth of machine tools. All were to be supplied by the United States.

Also approved was the purchase of $1.1 million worth of iron ore and concentrates for Bizone Germany, all to be supplied by Latin America and delivered in equal quarterly installments during 1949.

Reports Increase in Sales

Buffalo

• • • **National Gypsum Co.**'s sales so far this year are ahead of the corresponding period in 1948 "and the present outlook justifies the expectation of dividends in 1949 at least equal to 1948," Melvin H. Baker, president, told directors. "With the completion of our $36 million expansion program, all of our new capacities are in operation. As a result, while residential construction is currently running behind last year's volume, our sales so far this year show an increase."

Reduces Working Week

Providence

• • • **Brown and Sharpe Mfg. Co.** reduced its work week from 40 to 35 hours, beginning Monday, March 7. Dollar shortages abroad resulting in a falling off of machine tool orders was blamed for the cut in working time. The move is designed to spread available work among present personnel, thereby preventing layoffs, Arnold K. Brown, vice-president, said.

50 YEARS AGO

THE IRON AGE, *March 9, 1899*

• "The Bath Iron Works, Bath, Me., have some $2,250,000 worth of shipbuilding work on their books, and are looking forward in consequence to a lively summer's work. The company are about to increase the number of workmen to 1200."

• **"Charles M. Schwab, President of the Carnegie Steel Co., Ltd., who is in Europe, sails for home on March 11."**

• "The Brier Hill Iron and Coal Company, Youngstown, Ohio, recently made a shipment of 47 cars of pig iron to Genoa, Italy."

• **"The Minnesota House of Representatives have rejected a bill providing a bounty for pig iron produced in Minnesota."**

• "At the plant of the Shenango Valley Steel Co., New Castle, Pa., now owned by the National Steel Co., copies of the following notice have been posted: 'On and after Mar. 1, 1899, wages of all employees of the Shenango Valley Steel Co. will be increased as follows: Employees receiving $1.50 per day or less, 10 per cent; employees receiving over $1.50 but not over $2.00 per day 7½ per cent; employees receiving over $2.00, but not over $2.50, 5 per cent.'"

• **"Phillip D. Armour has given a further sum of $750,000 to the endowment fund of the Armor Institute of Chicago, making his total gift to the Institute $2,250,000."**

• "Last week Councils of Pittsburgh passed an ordinance vacating a certain number of streets in the vicinity of the American Iron and Steel Co., of Jones & Laughlin, Ltd., on the S. S. Pittsburgh, to allow that concern to make some large additions to their plant."

Charles H. Longfield, Youngstown V-P, Dead

Clearwater, Fla.

• • • **Charles H. Longfield,** 56, vice-president and general sales manager of the Youngstown Sheet and Tube Co., Youngstown, Ohio, died suddenly on March 7, in a hotel at Clearwater, where he was spending a short vacation. He was very well-known in the steel industry and his death comes as a great shock to all who knew him. Mr. Longfield became associated with Youngstown in 1932 as general manager of sales and last April was elected vice-president of the company.

Shortly after World War II was declared, Mr. Longfield went to Washington to help organize the Steel Div. of the War Production Board, an assignment lasting 3 years. He became chairman of the production directive committee which directed activities of the steel industry regarding the amount of tonnage, type of production and distribution.

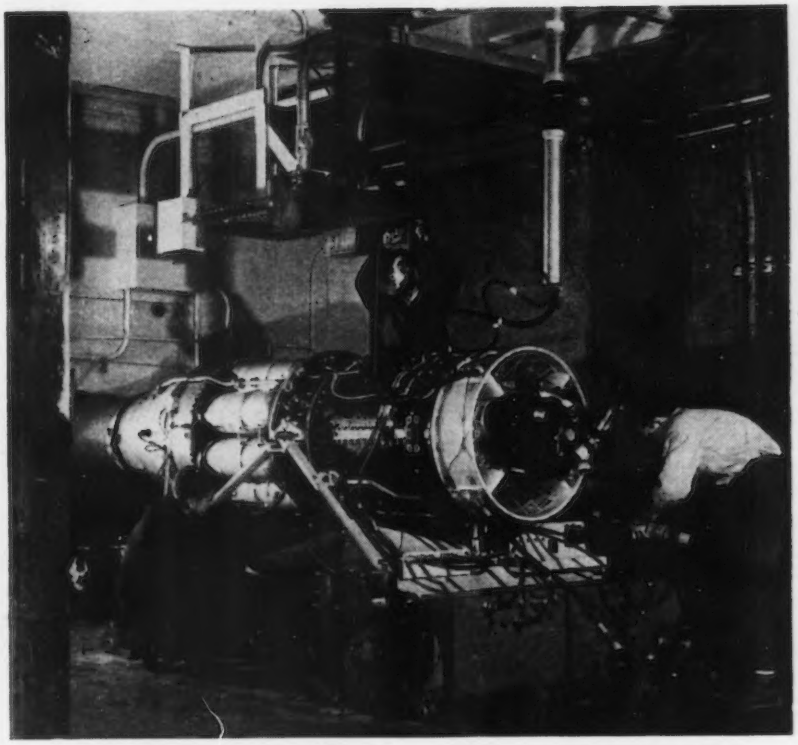
Mr. Longfield was a member of the American Iron and Steel Institute and the Youngstown Chamber of Commerce and many organizations in the steel industry. Surviving are his widow, a son and a granddaughter.

Says Substantial Foreign Trade Awaits Americans

Chicago

• • • **Harold D. Arneson,** president of Abbott Laboratories Export Corp., told the Chicago World Trade Conference on Feb. 24, that $20 billion worth of foreign trade opportunities a year await American traders in today's world markets.

He quoted Paul Hoffman, ECA director, to the effect that "World trade is assurance against severe depression." Mr. Arneson went further and declared that "as exporters through skillful practice of our profession, we can do much to open markets that will provide a stable demand for American goods. Despite all loose talk to the contrary there are several important markets in both hemispheres which have dollars to spend and are willing to spend them for the goods they need," Mr. Arneson said.



GE Ships First Jet Engines from Lockland Plant

• • • **The first aircraft** jet engines produced at the General Electric Co.'s recently acquired Lockland, Ohio, plant were shipped to the Air Force on Feb. 28, less than 5 months after plant operations were started and within 9 months from the time GE took over the plant. With orders for more than 2000 of the new J-47 engine, it is expected that it will take a year before plant operations are on a full scale basis.

The Lockland plant, operated during the war by Curtiss-Wright as an engine plant, is part of the GE Aircraft Gas Turbine Divisions, Lynn, Mass., where the J-47 engine, successor to the J-35, was designed. The new plant is entirely an assembly operation, drawing components from about 120 subcontractors throughout the country. Some of the main subcontractors include Wright Aeronautical; Ryan, Solar, and Ranger Aircraft Co.'s; Thompson Products Co.; Heintz Mfg. Co.; and Vinco; all supplying either components or subassemblies for the engine.

The first two J-47 engines to be produced at Lockland were turned over to the Army Air Force at a celebration attended by Air Force officers and civic and business leaders of the Cincinnati area. Charles E. Wilson, president of GE, described the operation of the plant and the early shipment of the engines as typical of teamwork between industry and the Air Forces. While the Lockland-built engines are assembled and tested at the new plant, the company will continue to manufacture parts for engines built at the GE River Works, at Lynn, Mass.

The J-47 is a turbojet comprising multiple combustion chamber and an axial flow turbine, and can burn either kerosene or gasoline. The engine has a 12-stage compression cycle. It is used in the B-45 bomber and the F-86 penetration fighter, both of which are North American designs. The F-86 last fall set an official world speed record of 670.891 mph.

While full scale production may be expected in about a year, exact production figures cannot be revealed for security reasons. However, it was pointed out that orders for about 2000 engines have been placed and the Air Force has on order 584 F-86 fighters.

Westinghouse Gives Some Details on Its Conversion Costs

Pittsburgh

• • • **Westinghouse** Electric Corp., which last year spent $13,250,000 above mill base prices for conversion steel, expects to stop using conversion steel by the middle of the year. This was disclosed recently by president G. A. Price, who also said that the comparable 1947 bill had been $6,500,000.

Andrew H. Phelps, Westinghouse vice-president, purchases and traffic, explained in a press interview that the company had calculated its extra costs for conversion steel over mill base prices, not over base prices plus extra charges. It is believed that if it had been possible to make the comparison on the latter basis the additional costs would have been less than $10 million in 1948 and less than $5 million in 1947.

The openhearth at the New Castle, Pa., plant of United Engineering & Foundry Co., which has been supplying Westinghouse 4500 tons of ingots a month has been shut down for repairs. The repairs were to take 10 days but the furnace will probably remain off at least until the end of March to see if its ingots are still needed. This furnace, Mr. Phelps said, produced high quality ingots at the lowest price it was able to get anywhere.

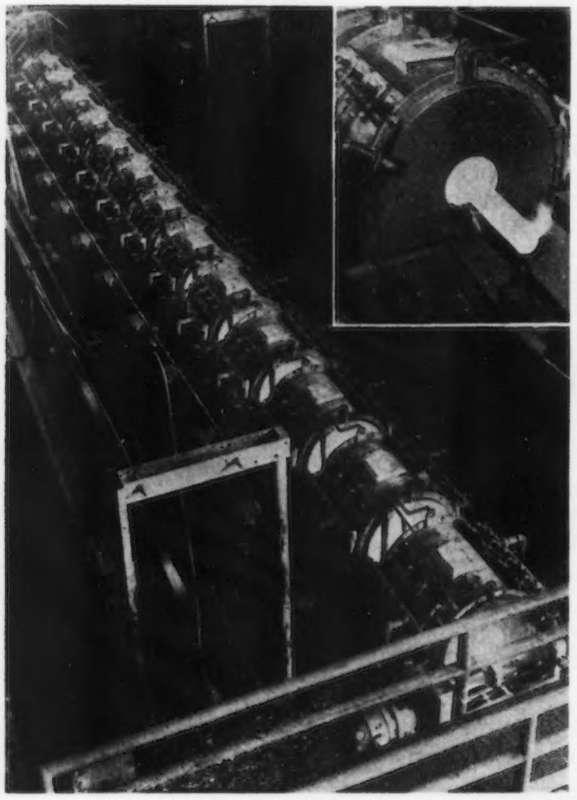
While Westinghouse plans now to use about the same total tonnage of steel in 1949 as it used last year, purchasing officials feel that this quarter may see the end of conversion arrangements because regular steel supplies are increasing steadily. The company has only one non-cancellable conversion contract and that expires Mar. 31.

Ford Furnace Hitting Peak

Detroit

• • • **Peak production** of 1400 tons of pig iron daily in the new Ford "C" blast furnace is predicted for March when new ore and coke transfer cars are installed.

Currently, the new furnace is producing 1200 tons daily. According to Ford sources, approximately 100,000 tons of pig iron have been produced since the new furnace was first lighted in mid-November.



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DOUGHNUTS: *Seamless steel tubing is shown passing in the line of 13 Selas "doughnut" reheating furnaces at National Tube Co.'s Gary mill. Speed of steel through the line is adjustable. Electric eyes (note cylindrical gadget focused on heated tube in inset photo) adjust temperature automatically at each unit. Thus accurate temperature is obtained for truing pipe to size desired by this U. S. Steel Corp. subsidiary.*

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Schiavone-Bonomo Corp. Celebrates Anniversary

New York

• • • **Last week** Schiavone-Bonomo Corp., Jersey City, N. J., one of the country's leading scrap iron and steel firms, celebrated its 50th anniversary. At the same time the firm announced a new slate of officers.

Richard V. Bonomo, former secretary-treasurer, became the new president. He succeeded Louis Schiavone, who will carry on in the new post of chairman of the board after 46 years in the business. Herman D. Moskowitz, past President of the National Institute of Scrap Iron and Steel continues as vice-president. Emanuel J. Moskowitz is the new treasurer and Alfred T. Sforza, secretary. Murray Kunin continues as comptroller.

Richard V. Bonomo

The company, which employs over 300 persons and carries on operations throughout the eastern seaboard with main offices at Jersey City and nine operating yards, had its beginning 50 years ago in a small junk shop in New York.

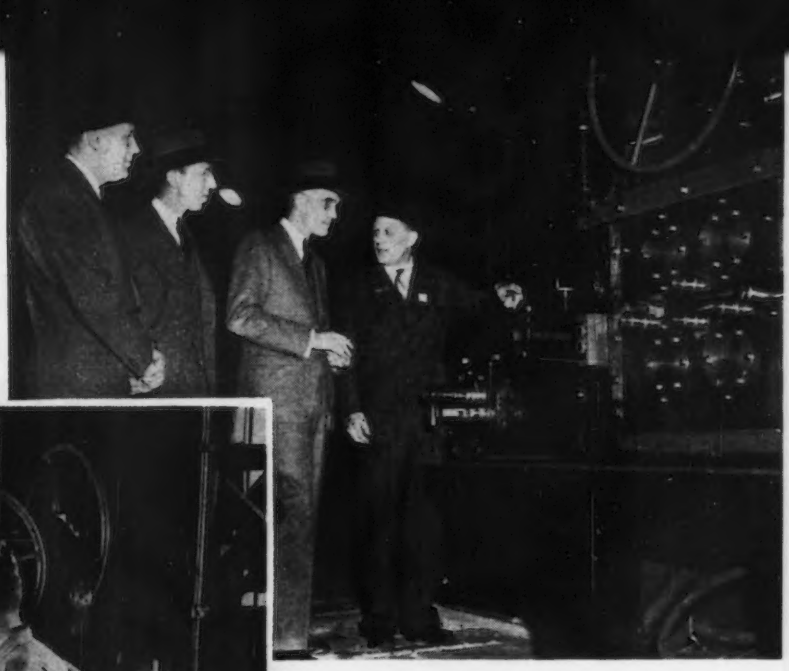
The company has specialized in railroad dismantling operations to provide choice scrap for the mills. A fleet of trucks, trailers and mobile cranes has made it possible to carry on many dismantling jobs in the field. Among the railroads scrapped were a number of obsolete New York elevated lines. The company also engages in an extensive ship-dismantling operation.

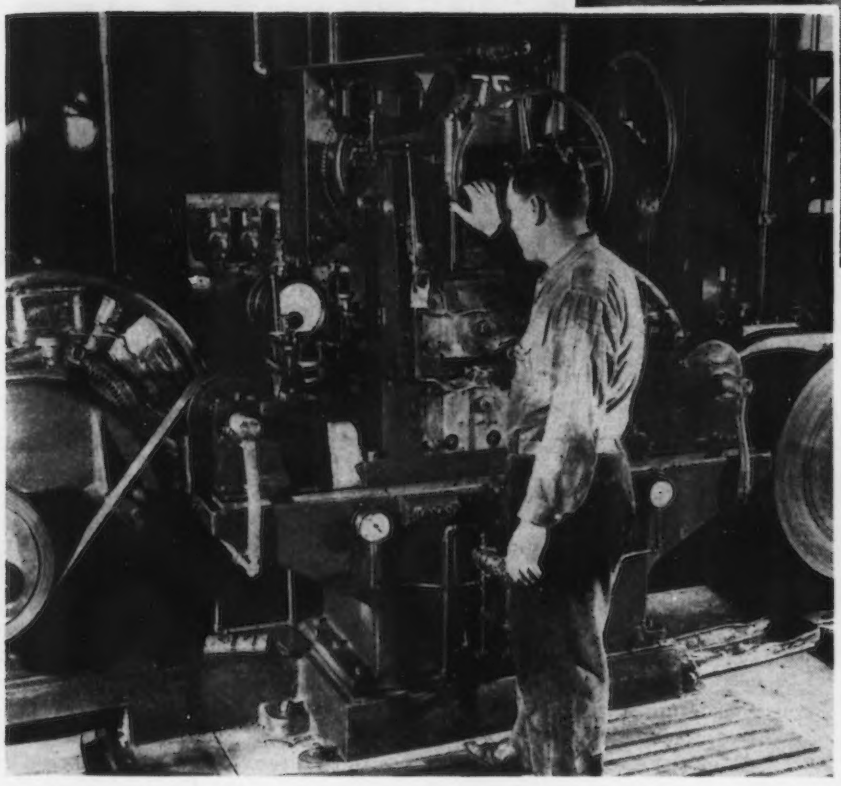
Louis Schiavone

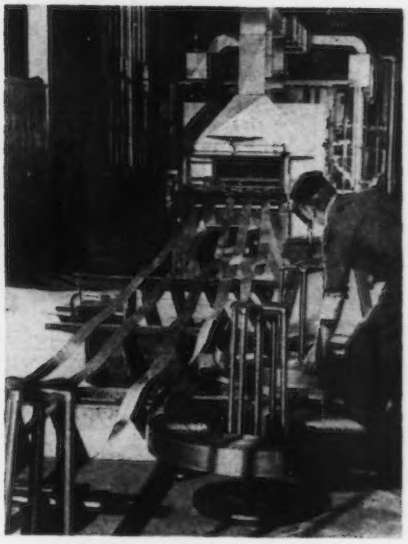
At a press reception celebrating the company's anniversary, R. V. Bonomo said that he believed this country would again be exporting scrap much sooner than most people think—possibly in a couple of years.

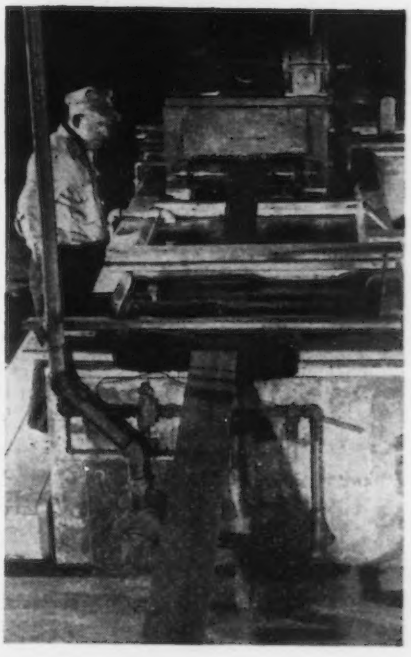
NEW

Crucible's New Spaulding Works Producing Wide Range Of CR Specialty Steels









THE new Spaulding Works, Harrison, N. J., Crucible Steel Co. of America, is now in production on a wide range of cold-rolled specialty strip steel products including alloy, stainless and high-carbon steels, precision castings, and stainless steel and Alnico castings. The new plant is located at the site of the former Atha Works of Crucible, a plant that produced ordnance steels. The company has withdrawn permanently from the ordnance field.

Specialty strip is rolled at the Spaulding Works from stainless, alloy and high-carbon steel hot bands produced in other Crucible plants. A battery of 15 high speed reversing mills, designed by R. G. Bennewitz, mill superintendent, each employ two work rolls and four back up rolls, as seen in the view of the mill being studied by Crucible officials, from left to right: R. S. Poister, vice-president; M. E. Cummings, assistant to president; W. H. Colvin, president; and W. D. Gross, manager, Spaulding Works. The Bennewitz mill rolls accurately to gage, down to 0.004 in., at speeds up to 1200 fpm. The rolls have no crown. This mill will roll bands containing up to 1.25 pct carbon.

Special emphasis has been laid on product quality control which has been achieved by heavy expenditures for modern pickling, annealing and heat treating facilities. Continuous strand pickling equipment for stainless steel employing sulfuric acid is shown at the right. Some steel strip is hardened by being passed through a series of lead baths, the first at 1550°F, followed by quenching at 650°F, cooling in air, and tempering in lead at 750°F. Or cold-rolled steels, may be heated in a gas-fired furnace, above, right, employed principally for stainless steels, at temperatures up to 2000°F.

The Special Products Div. of Spaulding Works produces hundreds of thousands of Alnico permanent magnet castings per month. Other products include precision castings, cast alloy tools and sand castings.

Construction Steel . . .

• • • **Fabricated steel awards** this week included the following:

460 Tons, Bristol, Pa., enameling building for Kaiser Engineers, Inc., to Belmont Iron Works, Philadelphia.

350 Tons, Baton Rouge, La., building for Standard Oil Ethyl Corp. To Stone & Webster Co., Chicago, to Henry Grant & Co.

350 Tons, Lancaster, Pa., plant for Hamilton Watch Co., to Bethlehem Steel Co., Inc., Bethlehem.

260 Tons, New York, Home for Aged & Infirm Hebrews of N. Y.

250 Tons, Middleboro, Mass., bridge to Groisser & Shlager Iron Works, Somerville, Mass.

150 Tons, Cambridge, Mass., new Botonic Garden apartments through Aberthaw Co., Boston, to Groisser & Shlager Iron Works, Somerville, Mass.

120 Tons, Lowell, Mass., new building for Middlesex Supply Co. to Groisser & Shlager Iron Works, Somerville, Mass.

100 Tons, North Chicago, Ill., Abbott Laboratories fermentation plant to Hansell Elcock Co., Chicago.

• • • **Fabricated steel inquiries** this week included the following:

6000 Tons, Harrisburg, Pa., bridge over Susquehanna River, Booth & Flinn, Pittsburgh, low bidders.

1525 Tons, Oakland, Calif., railroad overhead on East Shore Freeway at High St., Calif. Div. of Highways, Sacramento, bids to Mar. 30.

450 Tons, Odair, Wash., U. S. Bureau of Reclamation Spec. 2540, stop logs for dam construction.

• • • **Reinforcing bar awards** this week included the following:

300 Tons, Chelsea, Mass., foundation for Mystic River Bridge through Allied Engineering Corp. to Truscon Steel Co., South Boston, Mass.

• • • **Reinforcing bar inquiries** this week included the following:

3100 Tons, Coulee Dam, Wash., feeder canal and railroad relocation, Bureau of Reclamation, Coulee Dam, Spec. 2586, bids to Apr. 1.

420 Tons, Oakland, Calif., railroad overhead on East Shore Freeway at High St., Calif. Div. of Highways, Sacramento, bids to Mar. 30.

• • • **Steel pipe awards** this week included the following:

180,000 Tons, San Francisco, Pacific Gas & Electric Co. 34-in. steel gas pipe line from Topak, Ariz., to Milpitas, Calif., to Consolidated Western Steel Corp., Los Angeles.

• • • **Steel piling awards** this week included the following:

600 Tons, Chelsea, Mass., foundation for Mystic River Bridge through Allied Engineering Corp. to Carnegie-Illinois Steel Corp., Chicago.

• • • **Railroad car awards and inquiries** this week included the following:

Chile Exploration Co. has ordered 100 70-ton ore cars from Greenville Steel Car Co., Greenville, Pa.

Final (?) Battle of the Basing Points on Its Way

Washington

• • • **The stage is set** in the House of Representatives this week for a crucial battle in the legislative campaign to legalize delivered prices.

The battle, which appears to have at least a 50-50 chance of success, will be over the bills (S. 1008, H.R. 2222) sponsored by Senator Myers and Representative Walter, both Pennsylvania Democrats, to declare a moratorium until July 1, 1950, on antitrust statutes applying to pricing systems.

Earlier attempts by Senator Johnson., D., Colo., and Capehart, R., Ind., to enact legislation directly legalizing good-faith freight absorption now appear to have gone by the boards. Congressional leaders have decided to push the Myers-Walter measure in the hope that the Supreme Court's forthcoming decision in the rigid conduit case will correct the uncertainty created by the court's decision in the cement case.

Walter, for example, said in reporting his bill to the floor of the House:

"It is expected that at its Fall term the Supreme Court will render an opinion which will set at rest the doubts raised in the cement decision.

"**Should those** doubts be resolved in favor of the validity of delivered pricing and freight absorption as such, there may well be no need for permanent corrective legislation.

"On the other hand, should the court pronounce more firmly the vague dicta of the cement decision, then the Congress will have, by force of this reported bill, until July 1, 1950, to undertake the passage of legislation expressing its intent with respect to the legal status of delivered price systems."

Furthermore, Walter stated, the period of moratorium "will provide affected industries with some opportunity of adjusting themselves to whatever may be the shape of requirements imposed by this strange, unrealistic philosophy of pricing."

Walter declared that "business is in a serious dilemma," and said that strict application of what many conceive to be the true meaning of the cement decision might "necessitate violent and sudden relocation of many industries throughout the country."

"The spectre of ghost towns, which even now haunts many areas of concentrated cement production, might be a common sight throughout the land. It is submitted that visitation of such troubled possibilities upon business is needless, unwarranted, and calls for at least a breathing period during which a proper orientation may be had in the light of additional clarification from the Supreme Court," he said.

It is possible that the Supreme Court may hand down its ruling in the conduit case before it recesses early in June, instead of during the Fall term, as suggested by Walter. Many congressmen and officials of the Federal Trade Commission expect the court to clear up the uncertainty created earlier by the cement decision.

Reports Higher Income

Cleveland

• • • **Eaton Manufacturing** Co. and subsidiaries report net profit for 1948 of $10,971,106, compared with $7,436,131 for 1947. Sales for 1948 showed an increase over 1947 both in dollar and unit volume, being in the amount of $128,132,677 for 1948 compared with $99,602,639 for 1947. Dividends, including two extras, paid to shareholders during 1948 totaled $6,242,747.

Capital expenditures incurred during 1948 amounted to $4,379,656, including the cost of a plant in Saginaw, Mich., purchased from the government. Another building was purchased in Cleveland for the use of the general research division.

PIPE LINE TO TREASURE

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A Clearing press is a pipeline to profits, too—far more certain, if less spectacular, than drilling for oil. Definite reductions in manufacturing costs are achieved by faster output, fewer rejects, longer die life. Let us tell you about the Clearing features of design and construction that account for these accomplishments.

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Standard

GRAVITY & POWER CONVEYORS

Kaiser-Frazer Reports No Further Plans To Acquire More Plants

Willow Run

• • • **After making** provision for income taxes of $9 million, Kaiser-Frazer Corp. has reported net earnings after taxes for 1948 of $10,362,098. This is at the rate of $2.27 per share compared with $4.00 per share in 1947 when no taxes were payable.

Net assets of K-F amounted to $66,118,088 and working capital at Dec. 31 amounted to $42,915,652. Plant, machinery and dies at year's end were valued at $42,718,736.

Plant acquisitions completed during the year included The Ironton Blast Furnace at Provo, Utah, a blast furnace at Cleveland, Ohio, and a steel mill at Phoenixville, Pa. Arrangements were also made to purchase the Willow Run plant. The report said no further plant acquisitions are contemplated in the near future.

Reported dollar volume of sales of cars, parts and accessories amounted to $341,552,440. Cars sold numbered 181,000 compared with 144,000 in 1947.

Chosen to Head Research On Structural Elements

Washington

• • • **Bruce L. Wilson** has been appointed Chief of the Engineering Mechanics Section of the National Bureau of Standards. In this capacity, he will direct research on structural elements and metal structures to determine their strength, deformation under load, and other mechanical properties and will correlate the results with the theory of elastic and inelastic behavior of materials. He will also conduct research on special apparatus and methods for measuring forces, deformations, and hardness, and methods for calibrating such equipment.

Mr. Wilson has been in charge of experimental research to determine fatigue strength of screw threads of various thread forms for tests being made by the National Bureau of Standards in cooperation with the British National Physical Laboratory and

the Canadian National Research Council. He has led in the development of large-capacity calibrating devices for use with testing machines for loads up to 10 million lb and has actively engaged in the investigation of dynamometers, strain gages, and methods of measuring hardness.

Announces Awards For Best Welding Papers

• • • **Six prize awards** totaling $2250 for the best papers on design, application and research in resistance welding, submitted to the American Welding Society prior to Aug. 1, 1949, have been announced by the Resistance Welder Manufacturers' Assn.

Top prize of $750 will be awarded for the best paper from an industrial source dealing with such topics as redesign of a product for lower cost manufacture by resistance welding; product improvement through use of resistance welding; resistance welding research; development of new procedures which broaden the usefulness of resistance welding; etc.

Authors of the second and third best papers in this category will be awarded prizes of $500 and $250 respectively.

The author of the best paper submitted by a university instructor, student or research fellow will receive a prize award of $300, with a $200 prize for the second best paper, from a university source, which in the opinion of the Board of Awards represent the greatest "original contributions to the advancement and use of resistance welding."

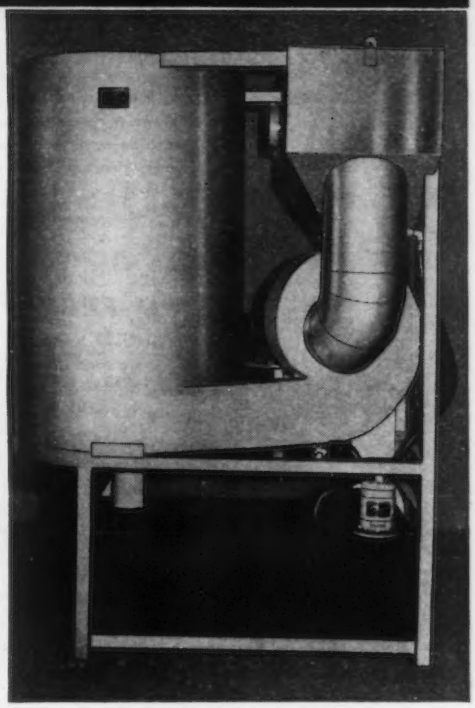
A new $250 prize for the best paper by an undergraduate student has been added this year for the first time.

Anyone in the United States and Canada is eligible to compete for these prizes, the contest judges for which will be appointed by the American Welding Society. Industrial sources include not only manufacturing, but also consulting engineering and laboratory organizations.

Copies of the simple rules governing the awards are available from the Resistance Welder Manufacturers Assn., 505 Arch St., Philadelphia 6.

Control DUST... FUMES

AT LOWER
HEATING
INSTALLATION
MAINTENANCE
COST



Niehaus Dust Separator

The new Niehaus *Dust* Separator is a complete, easily installed unit that employs water action to cleanse the air in your shop of dust and foreign particles produced by polishing, buffing and grinding.

Placed adjacent to machines being exhausted, the Niehaus Dust Separator, by high centrifugal action, thoroughly mixes atomized water with dust-laden incoming air and washes out the entrained foreign matter.

The refuse thus collected goes into a portable tank in the bottom of the unit. The cleansed air is discharged into the room from the top of the machine. Costly heat that normally is discharged out-of-doors is saved by the Niehaus method.

Niehaus Fume Separator

The Niehaus *Fume* Separator controls fumes from your cleaning and plating tanks by the principle of water absorption and centrifugal separation. The Niehaus method has proved so efficient under all shop conditions that many first purchasers quickly modernized their plants completely by installing additional Niehaus Separators.

This revolutionary method allows the entire fume control process to be accomplished alongside your tanks . . . does away with large, expensive blowers; with costly, space-consuming overhead ductwork. The operation requires no outside enclosures, thus conserving your shop's heat.

The cost of Niehaus Separators are low. They are easily and inexpensively installed. Your savings in ductwork alone usually will more than pay for the installing. In addition, you reduce your fuel bill and your maintenance costs.

Niehaus Separators are manufactured in several models and are furnished with either plain or stainless steel chambers. They are applicable for any size installation. Send for illustrated folder which gives complete information and specifications.

Niehaus Separators are distributed by local representatives throughout the United States. Your dealer's name will be supplied on request.

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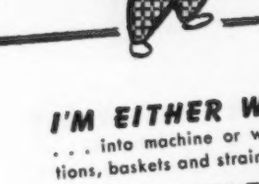
"With me it's just work, work, work — particularly **WIRE WORK!**

"Just about every industry (it seems) knows about my large range of weaves, crimps, metals, mesh and wire sizes . . . and about my maker's extensive facilities for working me into baskets, machine and window guards, partitions, enclosures, strainers and reel covers."

ONE MINUTE I'M FRAMED

. . . but I know all the ANGLES . . . and CHANNELS. When you see me with a ROD, you know I've been framed. Naturally, I'm always on GUARD. (Buffalo Wire, of course).



NEXT MINUTE I'M FORMED

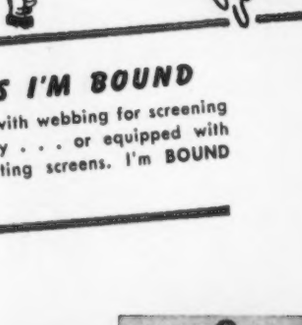
. . . into strainers or some specially ordered designs. My foundry work keeps me in RIDDLES all the time.

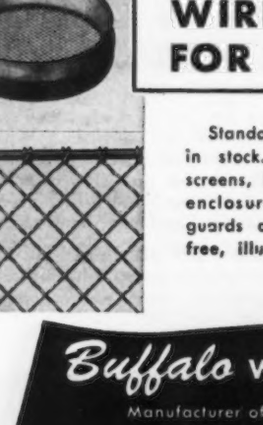
I'M EITHER WELDED

. . . into machine or window guards, partitions, baskets and strainers . . .

OR I'M SOLDERED

together with other wire cloth into big panels (reel covers).





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. . . along the edges with webbing for screening and bolting machinery . . . or equipped with hook strips for vibrating screens. I'm BOUND to please.

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Sees Heavy Industrial Building Continuing In Southwest in '49

Houston

• • • **Because of the** natural flow of industries to the Gulf Coast area, industrial construction in the Southwest in 1949 will at least equal the high level reached in 1948, it was forecast recently by C. W. Roberts, southern district manager of the H. K. Ferguson Co., industrial engineers and builders of Cleveland, New York and Houston.

"This section is potentially the future chemical center of the world," Mr. Roberts said, following a survey of building prospects conducted by his firm. "The combination of raw materials, low power and fuel costs, and excellent rail and water transportation invite location here."

The survey found seven factors which indicate a large volume of industrial building in the Southwest:

(1) Immense reserves of salt and sulfur. Texas and Louisiana produce more than 95 pct of the United States output. Large salt reserves would invite the production of chlorine and caustic soda, two basic industrial chemicals.

(2) Production of soda ash continues well behind demand and any expansion of this industry would most probably be along the Gulf Coast.

(3) The scarcity of cement both for domestic use and export. Thousands of barrels are now shipped from other areas or imported from Belgium to meet local demand.

(4) Fertilize manufacturing and blending industries are expected to expand and the necessary sulfuric acid will be produced locally.

(5) A trend toward stopping the flaring of gas wells will lead to the expenditure of many millions of dollars for absorption and recycling plants, ultimately dictating the production of numerous byproducts.

(6) As the dispersion of industry is increasingly important, the Gulf Coast offers possibilities for decentralization.

(7) A number of major companies have indicated the outcome of the election would not influence

their plans to build or expand in the Southwest.

"Wage increases already granted or in the making will increase construction costs in the Southwest," Mr. Roberts said, "but the increase will be offset somewhat by better labor productivity and improved materials. The leveling off or decline of public and private housing construction in this area should make more labor and materials available for industrial projects.

Raw Material Problems Seen Limiting Factors

Toronto

• • • **W. F. Angus,** president, Dominion Bridge Co., stated that volume of new business secured is being well maintained, but difficulty in obtaining raw materials is still a retarding factor in the company's operations.

"New addition to the heavy assembly shop at Lachine, Que., is practically completed and already is comfortably full of work. Large projects for hydroelectric power development in Quebec and Ontario have resulted in substantial orders being placed with the company and the new addition has amply justified its construction," Mr. Angus stated.

Welding Deliveries High

New York

• • • **1948 deliveries** of resistance welding equipment to industry reported by member companies of the Resistance Welder Manufacturers Assn. continued at the same high level as in 1947, close to five times total shipments during 1939, and six times the output for 1938, it was revealed recently by B. F. Wise, president of the association.

At the same time, shipments of resistance welding electrodes—the yardstick of utilization of resistance welding—reached an all-time high during 1948, with an increase of approximately 20 pct over 1947. Comparative electrode figures for prewar years are not available since these have been reported to the association only since April of 1946.

Dollar volume of unfilled orders as of Dec. 31 also totaled about five times the backlog in prewar years.

SAVED! A full month of man hours per year

- Seam welding wheels *make money* only when in use—*lose money* when idle for redressing.
- The difference between Weiger-Weed wheels and ordinary wheels is the less amount of dressing required.

In one of the nation's largest tube mills

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SEAM WELDING WHEELS

were found by actual record to require dressing only once every three weeks.

The wheels they replaced needed dressing once a week, requiring 6 man hours, totaling 312 man hours a year. In the same period, redressing Weiger-Weed wheels made of the alloy properly engineered for the application added up to only 104 man hours, a saving of 208 man hours, or a full month!

And all this time, the Weiger-Weed wheels were in service—producing. This is only one instance, and the time saving would, of course, vary under different plant conditions. But, for your problem in seam welding or any other phase of resistance welding, the answer is in the *metallurgy* that goes into Weiger-Weed products. Seam welding wheels, dies, electrodes, replaceable tips are made from high strength, high conductivity alloys, developed by Weiger-Weed engineers for long life on production runs and minimum down time.

Weiger-Weed wheels are supplied to your specifications, either finished ready for use, or in rough form for you to finish. Several sizes of blanks are carried in stock. You are cordially invited to ask for Weiger-Weed service on any resistance welding problem—Weiger Weed & Company, Division of Fansteel Metallurgical Corporation, 11644 Cloverdale Avenue, Detroit 4, Michigan.

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Resistance Welding ELECTRODES

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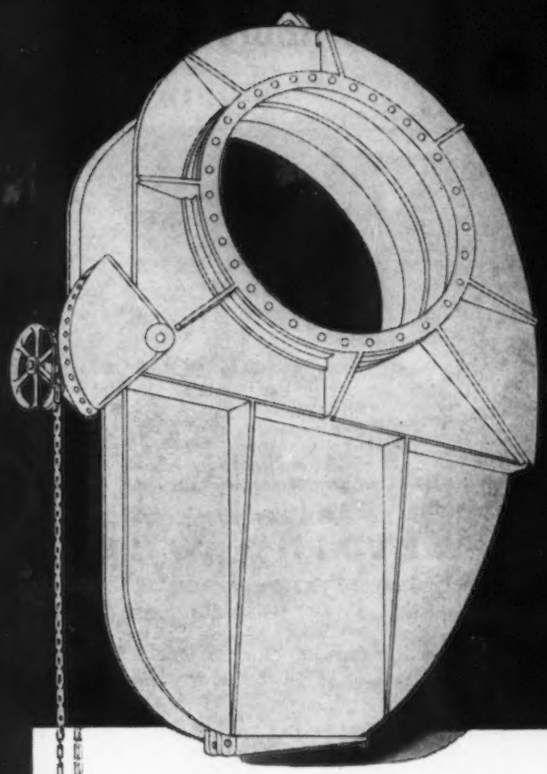

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More British Plants In Canada Follow Easing of Currency

Toronto

• • • **Since the end** of the war, 85 British industries have established plants in Canada, the majority in Ontario, and by 1950 the figure is expected to reach 100. The ocean-spanning movement has been given impetus by the Ontario government, and recently the British Treasury relaxed its currency restrictions to permit British firms to obtain the finances necessary for new plant construction in Canada.

With over 350 British firms operating in Canada by the end of the year, officials predict a large flow of United States dollars into Canada. Britain gets payment in Canadian dollars, which in turn will be used to boost her purchasing power in this country. The change in the attitude of the British government toward firms wishing to establish in Canada is believed due to its desire to see an industrial setup on this side of the Atlantic capable of rapid switching from peace to war production.

Assistance in overcoming financial and other obstacles has been provided British firms by the Ontario government and to some extent by the United Kingdom. Since last July the British Treasury has utilized $300 million for this purpose. This was the amount left from the $700 million loan Canada made in 1942, according to official sources.

1948 Registrations Reach Postwar Peak

Detroit

• • • **Total registrations** during 1948 of 3,490,952 new passenger cars and 1,035,174 trucks in the United States have been reported by R. L. Polk & Co., Detroit, statisticians for the automotive industry.

December registrations of new passenger cars totaling 311,419 were slightly lower than the November figure and also less than the number of cars registered in December 1947.

The 1948 total was the highest since resumption of automobile production following the war, al-

though slightly less than the number of passenger cars registered in 1941.

Total truck registrations established a new peak in the history of the industry, passing the million mark for the first time. In 1947 new truck registrations totaled 879,132.

Polk pointed out that new truck sales have been declining steadily since April.

Ford Motor Company Releases Its First Organization Chart

Detroit

• • • **If any proof** is needed that vast changes are taking place at the Ford Motor Co., the evidence was available this week when Henry Ford II released the first organization chart in the history of the company. Under the elder Ford, titles were used sparingly, if at all, and often clear-cut individual responsibilities were not evident even to those who were thoroughly familiar with Ford operations.

Simultaneously, it was announced that Lewis D. Crusoe will be in charge of the new Ford Div. of the Ford Motor Co. Mr. Crusoe has been serving in the capacity of vice-president, finance, and will continue to supervise the financial and accounting departments until a successor is appointed.

The newly created Ford Div. will be responsible for the development, manufacture and sale of Ford cars and trucks. All Ford assembly operations will be under the new division. M. L. Wiesmyer will continue as production manager, Ford Div. E. G. Ward will continue as manager of all Ford parts and accessories; W. A. Williams will continue to direct Ford sales activities.

Staff members of the Ford organization in addition to Crusoe include: Ernest R. Breech, executive vice-president; John S. Bugas, vice-president, industrial relations; H. T. Youngren, vice-president, engineering; D. S. Harder, vice-president, sales and advertising. Four of the seven members of the Ford staff are former General Motors executives.

LARGE INDUSTRIAL GEARS

Bevel and mitre gears up to 60" dia. are cut on gear planers to accurate tolerances.

CUSTOM MADE GEARS

up to 145" diameter

You can save time, money and errors in your large and heavy industrial gear requirements with the prompt, custom service of SIMONDS GEAR. Within easy shipping distance of many heavy industry plants—with a personalized attention to your specific gear requirements—SIMONDS GEAR is able to assure you fast, accurate gear service for all heavier gear needs. Size range includes: Spur Gears up to 145"—Bevel and Mitre Gears up to 60"—Worm Gears up to 72"—also worms, worm gears, racks and pinions. Materials include: cast or forged steel, gray iron, bronze, silent steel, rawhide and bakelite. Place your next heavy gear inquiry with SIMONDS GEAR and test the difference!

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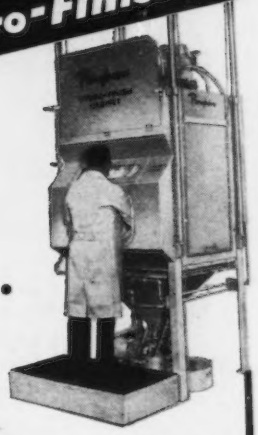
TOOL and DIE USERS!

Pangborn "Hydro-Finish"



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It improves surface finish, removes oxide scale, increases tool and die life through proper maintenance. Hydro-Finish is the new versatile impact blasting process that uses a fine mesh abrasive suspended in water and holds tolerances to .0001 inches.

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It can be used for deburring, surface finishing and lubrication control, removing heat treat scale and discoloration, preparing surfaces for plating or coating, removing directional grinding lines, finishing threaded section for better workability and fit, improving manufacturing, maintenance and life of tools and dies, general maintenance cleaning.

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Look to Pangborn for all the latest developments in Blast Cleaning and Dust Control Equipment.

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BLAST CLEANS CHEAPER with the right equipment for every job

SPRING LOCK WASHERS

with "Controlled Tension" built in

FOR LONGER LASTING SERVICE...BETTER QUALITY

Diamond G "Controlled Tension" in every spring lock washer makes assemblies tight . . . keeps them right. Garrett's exclusive "Controlled Tension" is the secret of the success of Diamond G Spring Lock Washers . . . the result of absolute, precision control in manufacturing. Every lot of Diamond G Spring Lock Washers is "torture-tested" to assure maximum quality and peak performance. Write for Lock Washer Booklet.

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MANUFACTURERS OF SMALL PARTS

Danes Study U.S. Production Methods

Washington

• • • **A five-man group** of Danish steel workers recently began a round of visits to American steel plants for the purpose of studying production know-how and how it might be applied to manufacturing in their homeland.

At the same time, three similar groups begin visits to plants in the machinery (including machine tool), shipbuilding, and meat packing industries. Each group consists of two representatives of management and three of labor.

The steel portion of the Danish contingent is made up of Jorgen Skov, an engineer and also leader of the delegation of 20; Svend Aage Weiss Hansen, a rolling engineer; Eiler Willumsen, fitter; Christian Hansen, heater; and, Knud Jensen, roller. All five men are from the Det Danske Staalvalsevaerk A/S, of Fredersksvaerk, Denmark.

Included on the group's itinerary are the Bethlehem works at Sparrows Point, the facilities of Lukens at Coatesville, Pa., Alan Wood at Conshohocken, Pa., and Worth Steel at Claymont, Del. Numerous other companies and plants will be visited.

The above named plants were included specifically because they employ items of equipment similar to that purchased by the Danish firm since the war from Youngstown Sheet & Tube to supplement existing capacity.

The Staalvalsevaerk plants now has a capacity of about 40,000 tons in shapes, plates and bars. It has been operating on funds allocated from an International Bank loan to Denmark.

The supplemental equipment purchased from Youngstown included a rolling mill and additional ship plate capacity. Total capacity is expected to be increased by 60,000 tons and installation is expected to be completed in March or April—by the time the visiting steelworkers get home.

Those representing the machinery industry are all from the Titan works. The Danish shipbuilding industry is represented by one man from the Nakshov and four from the Odense shipyards.

The Danish group is one of the first such delegations from the Marshall Plan nations as part of the ECA program.

First Canadian Firm Accepts Government's 50-50 Plant Offer

Ottawa

• • • **It is reported** here that the Dept. of Trade and Commerce has agreed tentatively to an arrangement with Dominion Foundries & Steel, Ltd., Hamilton, for the installation of a plant addition which may set the pattern for the aid to the steel industry promised in the speech from the throne. Under the proposed plan the federal government will finance through loans an amount equal to that subscribed by the company concerned.

It is now reported that, in connection with the proposed plan, Dominion Foundries & Steel has retained A. J. Boynton & Co., Chicago, as consulting engineers for the proposed 500-ton blast furnace whose cost is placed at $15 million. The project will include auxiliary equipment and coke ovens and it is expected the furnace will be completed by July 1950.

The new blast furnace would make the company a pig iron producer. At present it makes only steel and has to buy pig iron. Dominion Foundries is the first company to accept the government's 50-50 loan offer.

Canadians See More Steel Coming From U.S. in '49

Toronto

• • • **In a report** to the Executive Committee, the Canadian Manufacturers' Assn.'s special committee stated that so far as United States mills are concerned there are positive signs that the pressure for delivery of steel is easing. The prospects are that by the third quarter of this year a buyers' market will develop in some steel products. The bottom has dropped out of the gray market on steel sheets. Moreover, steel production in the United States in 1949 is expected to surpass the record set last year.

While there has been no apparent move on the part of the Canadian or U. S. Governments to enlarge the nominal Canadian import quota of 200,000 to 220,000 product tons of steel per quarter,

9 out of 10 Bearing Needs
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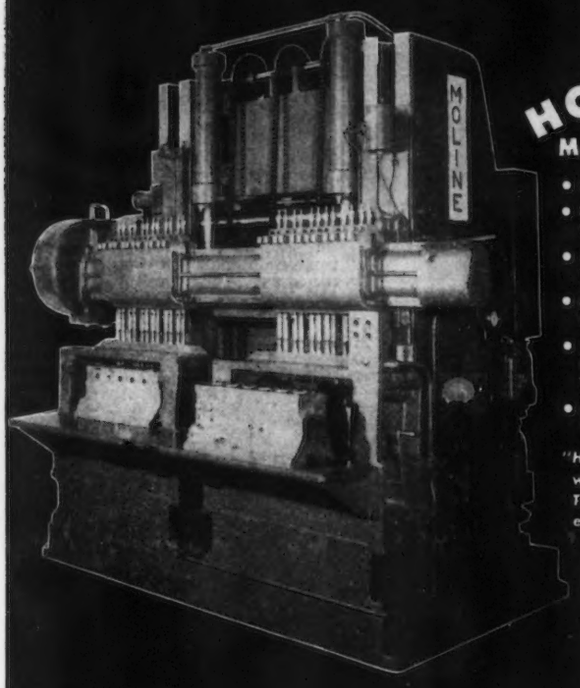

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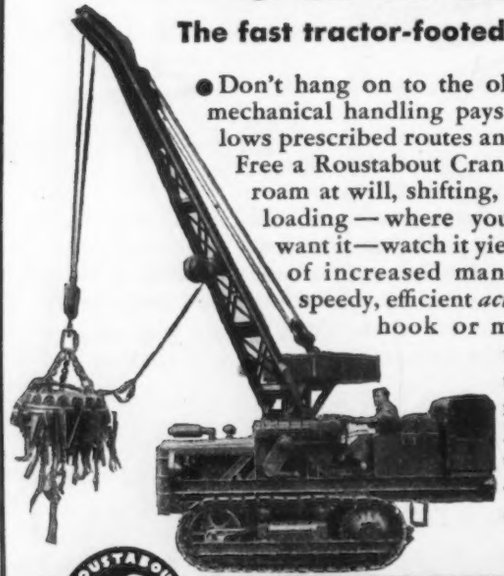

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the only actual control exercised over imported steel in Canada has been the rather loose one on structural steel. If steel becomes easier in the third quarter there will be little or no reason for the U. S. Government to insist that Canada live within the quota.

There has been a steady increase in the supply of steel coming to Canada from the United Kingdom and Belgium, with the expectation that substantially larger shipments will be made from those countries this year.

Reports Record Profit; Sees Good Year Ahead

Cleveland

• • • **Net sales** for Iron Firemen Mfg. Co. for 1948 attained the highest total for any peacetime year, according to T. H. Banfield, president. The year's net sales totaled $13,227,168, a 3.2 pct increase over the 1947 peak and 84.26 pct increase since 1940, it was stated. Net profit for the year was $701,225.

Mr. Banfield said, "The 1948 sales pattern for each type of product varied considerably from 1947. A year ago oil burners were in great demand and a considerable percentage of our total sales volume came from this equipment. During 1948, however, the sales on oil burners declined somewhat due to uncertain availability of fuel and sales restrictions. But this decline was offset by a 61 pct increase in stoker sales over 1947. This compares with a 24 pct increase for the stoker industry as a whole."

"A constantly shifting fuel situation" and steel shortages plagued Iron Firemen through 1948, Mr. Banfield said. He asserted that despite chaotic fuel conditions the "market for automatic heating and power equipment has grown rapidly and steadily," and that this trend is expected to continue. He also stated that a new industrial heating and power unit will reach the market this year and said it is probable still other units will have passed research tests in time to become available during 1949.

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GM Training Salesmen

Detroit

• • • **General Motors Corp.** has an interesting program for training young men to strengthen its sales organization. This is done through a cooperative training program. There are two starting dates for the Spring term—Mar. 21 and Apr. 18.

The 2-year program has been operated at General Motors Institute here for more than 20 years. It provides the student with alternating periods of study in the fundamentals of dealership operation at the Institute with coordinated periods of directed and practical work experience at his sponsoring dealership. Upon completion of the program, the graduate has an educational background for further development of qualifications necessary to assume future jobs of responsibility in the dealership.

Applications for enrollment may be made to General Motors Institute, or through any General Motors dealer with whom arrangements are made for sponsorship.

Enrollments of approximately 600 dealer cooperative students each year since the war indicates the increasing use being made of this program by General Motors dealers in developing young men for future responsibilities in their organization.

K-F Reports New Model

Willow Run

• • • **Kaiser-Frazer** played one of its trump cards recently when it announced that production will start no later than March 14 on its new Utility model—a special sedan that doubles for a station wagon.

The new car, which may prove especially attractive to salesmen, farmers and suburbanites, is priced at $2088. It will sell at $240 less than any of the present K-F models. With the exception of Willys, Crosley and the Chevrolet suburban, the K-F utility car may be the lowest-priced station wagon type car on the market.

In the new Utility model, the rear seat is of special design which folds out of the way, pro-

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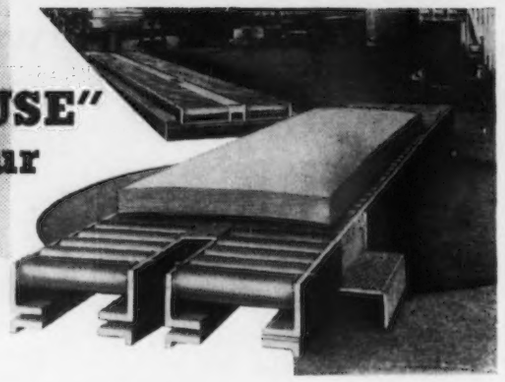

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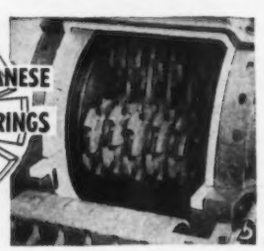

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viding 85 cu ft of unobstructed carrying capacity behind the driver's seat. The seat can be set up again in a matter of seconds.

The sedan body is built entirely of steel; there are no wood panels or wood decorative parts.

According to K-F officials, the Willow Run plant will remain closed for 3 weeks while tooling for the new models is completed. It is expected that production of the new Utility model will be in substantial volume. According to K-F officials, production of the present Kaiser and Frazer models will be continued when the plant is reopened. Approximately 7000 workers have been idled during the plant shutdown.

Steel Tops Contributors To '47 National Income

New York

• • • **The iron and steel** industry contributed more than any other manufacturing industry to the national income in 1947. Its production of national income was nearly tripled as compared with 1929, reports the American Iron & Steel Institute. These facts are revealed in a recent study on national income as compiled by the Dept. of Commerce, based on the latest available data.

The iron and steel industry, as defined by the government for this purpose, includes foundries and other closely affiliated activities but excludes mining and certain other operations, such as coke and its byproducts.

Since the middle thirties, steel has been in first place or very close to the top more consistently than any other manufacturing industry, according to the institute. It was first in 1929, and in six later years.

The steel industry's contribution in 1947 totaled $8186 million or 4.99 pct of private, nonagricultural income. This was $5.2 billion higher than in 1929, an increase of about 175 pct. The industry's payments in wages, salaries, social security, pensions and other compensations constituted nearly three-quarters of its contribution and also rose 175 pct.

In the same interval the industry's income taxes increased more than ten times; net after taxes gained 118 pct and dividends 11 pct, the institute reported.

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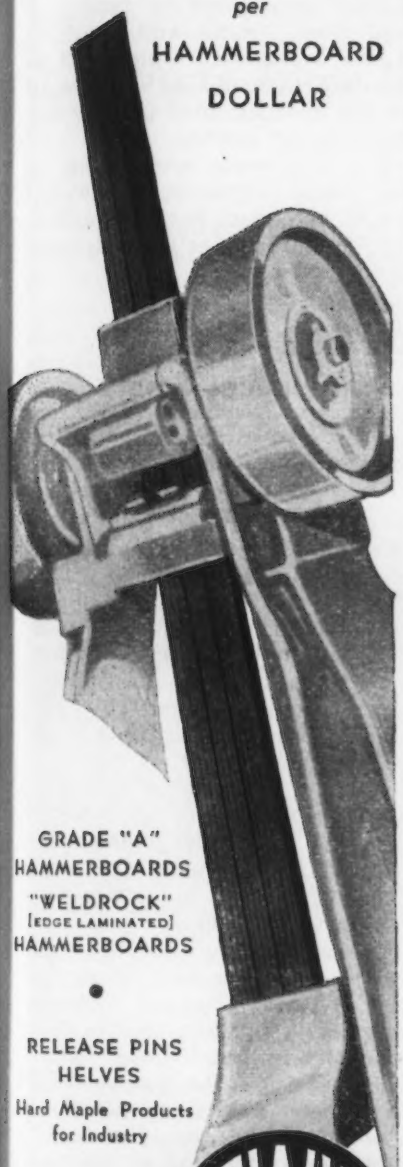
per
HAMMERBOARD
DOLLAR



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Bendix Aviation Corp. Buys Two WAA Plants

Chicago

• • • **Bendix Aviation Corp.**, wartime operator and peacetime leasee of the two aircraft part plants in South Bend, Ind., has purchased the properties from War Assets Administration. Full payment in cash of $1,500,000 was made Feb. 14 to WAA in Chicago.

The properties, designated by WAA as Plancor 14 and 171, were erected early in 1942 at a reported cost of $1,578,000. Plancor 14 consists of about 5¼ acres. Floor space of the two buildings is approximately 150,015 sq ft. Plancor 171 composes two buildings having a combined floor space of 145,480 sq ft and is located on about 4¾ acres of land.

Prior to the sale, the Bendix Corp. operated the plant on an interim lease with WAA. Apr. 1, 1947, WAA issued a permit for the use of Plancor 171 for a rental of $1764.14 per month and later in the year another portion of this plant was leased to Bendix for a rental of $3979.08 per month. The purchase of the plant by Bendix cancels all leases and permits on the buildings between themselves and WAA.

Malcolm P. Ferguson, president of Bendix Corp., told THE IRON AGE that decision to buy these plants was made about 6 months ago. He said further that Bendix will continue to manufacture fuel injection equipment devices and pumps at these properties. The new jet fuel control line will be an important part of the production of these plants.

Files Antitrust Suit

Washington

• • • **Attorney General** Tom C. Clark on Feb. 16 announced the filing in the United States District Court in New Jersey, at Trenton, of an antitrust suit charging four corporations with conspiracy to monopolize and restrain trade in the cast iron pressure pipe industry.

The defendants are: Sand Spun Patents Corp., Philadelphia; American Cast Iron Pipe Co., Birmingham, Ala.; Florence Pipe Foundry & Machine Co., Florence,

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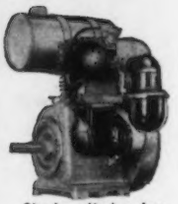

Single cylinder sizes 2 to 5 H.P.

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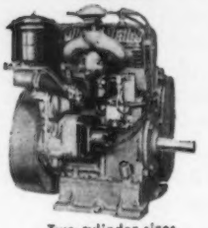
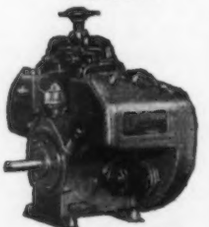
Here is reputability to match your own, no matter how high or exacting your standards may be. Every Wisconsin Engine from the smallest to the largest is of heavy-duty design and construction. The perfectly balanced drop-forged crankshaft of every Wisconsin Engine runs on tapered roller bearings at *both* ends to take up end- and radial thrusts . . . a typical detail of Wisconsin heavy-duty design that assures the user "Most H.P. Hours" of on-the-job service.

Wisconsin Heavy-Duty Air-Cooled Engines are available in 4 cycle single cylinder, 2- and 4- cylinder types in a complete power range up to 30 H.P.



Two cylinder sizes, 7 to 13 H.P.



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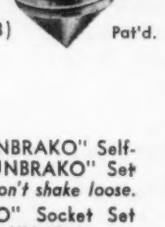

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N. J.; and Warren Foundry & Pipe Corp., Phillipsburg, N. J.

The complaint charges that the unlawful action was carried out through patent pooling and patent license agreements to limit the production, grades and qualities of cast iron pressure pipe, and to maintain a monopoly of patents for the production of pipe by the "Sand Spun" method.

The suit seeks cancellation of the illegal agreements, dissolution of defendant Sand Spun Patents Corp. and other relief against patent abuses.

Carnegie-Illinois Introduces Safety Courses in Schools

Chicago

• • • **In the past** 20 years the steel industry has devoted tremendous time, energy and money to the promotion of safety. A few decades ago the accident rate, injuries and deaths in steel plants were so high that the workers used to refer to the mill as the butcher shop. This is no longer true. The steel industry has achieved lower accident and better safety than any other comparable industry. In fact, they are so good today that some safety department officials are going around the country showing other industries how to work or play safely.

At times these safety courses get somewhat far afield from the steel industry. Typical example occurred on Feb. 23 when the Carnegie-Illinois Steel Corp. introduced safety in the classroom as a course for public and parochial schools in Chicago. Herold C. Hunt, superintendent of Chicago schools, and Charles D. Lutz, superintendent of the Gary schools, headed a delegation of about 350 school leaders who attended the conference.

Principal speaker at the dinner was E. E. Moore, industrial relations vice-president of Carnegie-Illinois Steel Co., Pittsburgh. B. M. Livezey, general superintendent of South Chicago plant; S. M. Jenks, general superintendent of Gary steel works, and Charles A. Ferguson, general superintendent of the Gary sheet and tin mill, all spoke briefly on safety methods and accident prevention procedures.

MACHINE TOOLS

. . . News and Market Activities

Reports Show Increase in ECA Orders for Machine Tools

• • • **An increase in** the volume of ECA orders and renewed interest on the part of buyers in the domestic market was reported this week by reliable sources in the machine tool trade.

In Detroit recent reports of activity at Dodge, possibly indicating the development of a new engine, were verified this week as quotations were requested on a limited number of machines. Presumably the tools are for a new engine program.

There were also unconfirmed reports that Ford is actively carrying on an investigation of high compression engines that may later reach the production line. Another hopeful indication here is the expectation that tooling for a new transmission for Detroit Gear Division will be placed within the next 30 to 60 days. As has been true in recent months, however, there are many more quotations on new tooling in Detroit these days than there are closings.

Reports indicate that deliveries on new equipment for the new GM technical center on Mound Road are excellent and that actually the tooling appears to be somewhat of the construction schedule. It is not expected that the new buildings will be started for at least another 30 days.

In Cleveland, sales of machine tools by National Acme Co. in 1948 dropped to about 77 pct of 1947 volume, F. H. Chapin, president, reported to shareholders. This indicated a "gradual, but definite return toward normalcy after a period affected by World War II," he said.

National Acme's net profit for 1948 was $1,505,019, equal to $3.10 a share, compared with $2,202,838 or $4.40 a share in 1947. The company was able to transfer to earned surplus $1,553,878 after settlement with the government in October of an income tax liability for the years 1940 and 1941.

Sees Hopeful Indications of New Engine Programs in Automotive Industry

o o o

Satisfactory operations for the first few months of 1949 are assured by order backlog. Mr. Chapin said the company has received "substantial" forward bookings under the Marshall Plan.

Also in Cleveland, National Machine Tool Builders' January index of new orders and shipments of machine tools showed a substantial increase in new firm orders for the month. Based on preliminary reports, NMTBA's index showed new orders at 87.1, compared with 76.7 for December; foreign orders 21.9 compared with 16.2 for December; shipments 68.8 compared with 96.9 for December, and ratio of unfilled orders to shipments, 4.6 to 1 compared with 3.2 to 1 for the preceding month. The January ratio is the highest since August, when it reached 5.2 to 1.

In Chicago, the Chicago Production Show and Technical Conference, sponsored by the Chicago Technical Societies Council, will present 53 speakers in 18 panel sessions on a broad variety of subjects March 14 through 17 at the Stevens Hotel. The show is an outgrowth of the clinics inaugurated in 1943 by the War Production Board. Incentives for research, fabrication trends, and management techniques will be discussed. Recent improvements in metal cutting practice will be discussed by J. S. Kozacko, University of Illinois, and William Oldacre, D. A. Stuart Oil Co. Trends in machine shop practice will be discussed by Ernest Noreen, Link Belt Co., and color sound film on tooling for jet propulsion will be shown by LaPointe Machine Tool Co., Hudson, Mass.

Alfred Herbert, Ltd., British turret lathe builder, has been trying to get some U. S. machine tool builder or major machine tool dealer to build the Alfred Herbert turret lathe for sale in the domestic market here, according to reports. At least one major machine tool builder and one of the big machine tool dealers have been formally approached.

In Omaha, Neb., charges that the Middle West is not getting its fair share of Marshall Plan business were renewed by A. M. Strong, vice-president, American National Bank & Trust Co., Chicago. Mr. Strong said ECA should publicize the requirements of the European nations well in advance to give all citizens an opportunity to participate in the business. Discussing steps which might be taken to improve the Middle West's place in the foreign trade picture, Mr. Strong suggested that each area in the country should publish an analysis of its products which might be sold overseas and of its market for imported goods, and should circulate these widely abroad. He urged also that ECA officials impress upon Marshall Plan countries the need for distributing their purchases over a wide area in the U. S. This was in line with recommendations made recently by the Illinois Manufacturers' Assn.

Industries where manufacturing costs are highest continue to be the best machine tool sales prospects. Included in this category are the automotive and home appliance industries.

Competition from foreign machine tool builders in Continental markets is getting tougher steadily, and some observers believe that it may be the eventual opening wedge toward lower machine tool prices.

NONFERROUS METALS

. . . News and Market Activities

Slipping Scrap Prices Not Reflected in Primary Metal Prices

New York

• • • **Consumers and** other factors in the metal markets have been avidly studying the repeated price reductions in scrap metals over the last few months, expecting this development to be translated into lower primary metal prices. There have been no reductions so far in the prices of primary metals, even though scrap prices continue on a downtrend. But easier markets in lead and zinc and a better balance in the copper market have made the payment of premiums for nearby delivery no longer necessary.

There are important differences between the metal markets of today and the prewar markets. Heavier domestic consumption rates have required much higher rates of imports of ores, concentrates and metal. In effect, domestic consumers are competing with the growing demand for metals by foreign nationals. Importers and producers are very conscious of the possibility of diversion of tonnage to foreign demand if price reductions are made here but not followed abroad.

Another difference in market practices is in selling copper only for delivery within 30 days, in contrast with previous practice of selling sometimes as long as 6 months ahead. Therefore there is little opportunity for speculation with attendant possibilities of dumping on the market.

Refineries have been largely out of the scrap market for copper grades for some time. It takes 90 days before copper bought as scrap can be refined and returned to the market — 30 days for transportation, 60 days for refining. Custom smelters are unable to look into the future for a period that long in order to buy at prices that will not represent a loss.

Absence of Speculation and Foreign Competition Seen Changing Market Trends

o o o

Nonferrous foundry orders have been slow for a long time and the impact of this has long been a factor in ingot order tonnages. With support lacking from two principal buying groups, it is no wonder that scrap prices have dropped rapidly. But this development is not expected to have any early effect on the price of primary copper.

Demand for copper is active despite some weakness in other metals. Brass mills are still buying copper, although their order backlogs are down in brass products. Copper products, particularly tubing, are still being ordered reasonably well. Wire mills are buying copper actively. Building wire and magnet wire order volume is reported to be off some, but other wire demand is heavy.

Management has been bearing down hard on inventories recently, and most metals are being limited to a 30-day supply. This policy has played an important part in freeing the lead and zinc markets. But there is a hazard involved in such short term inventories when markets are so heavily dependent on imports which may require from 60 to 120 days to arrive. According to some observers it is conceivable that industrial activity might well continue at its present high level, and shortages in some metals could develop again. Instances are reported of plants whose inventories are so low that metal shipments are needed within a few days in order to permit operations to continue.

The inventory consciousness of metal consumers is a far cry from a few months ago, when stockpiles of nearly all metals were considered better than money in the bank. Items which previously were hard to get were kept in stock so that they would be on hand when needed. Now that they are getting easier, nearly all consumers are subjecting their inventories to the closest scrutiny. The idea now is to let the other guy stock it, "We'll buy it when we have to have it."

Operations at the Utah mine of Kennecott have been resumed, but some observers predict that it will be June before this copper reaches the market. There is also the chance that it may not be possible for the fact finding committee to reach a solution agreeable to union and management. Most observers scout this possibility, feeling that the losses on both sides have already been too great to permit another work stoppage.

The strategic stockpile constitutes another strengthening factor on the metal markets. Producers can sell surplus tonnages to the government at present prices with very little difficulty.

There was a further decline of ¾¢ per lb in aluminum ingot prices last week. Aluminum scrap prices slid off another cent. Soft lead scrap was also down by 1¢. Other scrap metals were inactive. Neither ingot producers nor refiners were buying copper and brass grades. The smaller independent smelters are reported to be stocked up with calking lead which is being sold now at 17½¢.

Nonferrous Metals Prices

	Mar. 2	Mar. 3	Mar. 4	Mar. 5	Mar. 7	Mar. 8
Copper, electro, Conn.	23.50	23.50	23.50	23.50	23.50	23.50
Copper, Lake, Conn.	23.625	23.625	23.625	23.625	23.625	23.625
Tin, Straits, New York	$1.03	$1.03	$1.03	$1.03	$1.03	$1.03
Zinc, East St. Louis	17.50	17.50	17.50	17.50	17.50	17.50
Lead, St. Louis	21.30	21.30	21.30	21.30	21.30	21.30

Primary Metals

(Cents per lb, unless otherwise noted)

Aluminum, 99+%, 10,000 lb, freight allowed	17.00
Aluminum pig	16.00
Antimony, American, Laredo, Tex.	38.50
Beryllium copper, 3.75-4.25% Be dollars per lb contained Be	$24.50
Beryllium aluminum 5% Be, dollars per lb contained Be	$52.00
Cadmium, del'd	$2.00
Cobalt, 97-99% (per lb)	$1.65 to $1.72
Copper, electro, Conn. Valley	23.50
Copper, lake, Conn. Valley	23.625
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.8%, dollars per troy oz.	$2.25
Iridium, dollars per troy oz.	$105 to $110
Lead, St. Louis	21.30
Lead, New York	21.50
Magnesium, 99.8+%, f.o.b. Freeport, Tex.	20.50
Magnesium, sticks, carlots	34.50
Mercury, dollars per 76-lb flask, f.o.b. New York	$86 to $88
Nickel, electro, f.o.b. New York	42.93
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per troy oz.	$81 to $84
Silver, New York, cents per oz.	71.50
Tin, Grade A, New York	$1.03
Zinc, East St. Louis	17.50
Zinc, New York	18.198
Zirconium copper, 10-12 pct Zr, per lb contained Zr	$12.00

Remelted Metals

Brass Ingot

(Published prices, cents per lb delivered, carloads)

85-5-5-5 ingot		
No. 115	18.25*	20.00
No. 120	17.75*	19.50
No. 123	17.25*	19.00
80-10-10 ingot		
No. 305	....	25.25
No. 315	....	24.25
88-10-2 ingot		
No. 210	....	32.50
No. 215	....	29.50
No. 245	21.75*	23.75
Yellow ingot		
No. 405	15.25*	17.00
Manganese bronze		
No. 421	....	22.50

* F.o.b. Philadelphia.

Aluminum Ingot

(Cents per lb, lots of 30,000 lb)

95-5 aluminum-silicon alloys	
0.30 copper, max.	25.00-25.75
0.60 copper max.	24.75-25.25
Piston alloys (No. 122 type)	21.25-22.00
No. 12 alum. (No. 2 grade)	20.25-21.00
108 alloy	21.25-21.75
195 alloy	21.75-22.25
13 alloy	24.75-25.75
AXS-679	21.50-22.75

Steel deoxidizing aluminum, notch-bar granulated or shot

Grade 1—95 pct-95½ pct	22.50-23.00
Grade 2—92 pct-95 pct	20.75-21.25
Grade 3—90 pct-92 pct	20.50-21.00
Grade 4—85 pct-90 pct	20.25-20.75

Electroplating Supplies

Anodes

(Cents per lb, freight allowed, in 500 lb lots)

Copper	
Cast, oval, 15 in. or longer	40½
Electrodeposited	34⅝
Rolled, oval, straight, delivered	37.34
Ball anodes	38⅝
Brass, 80-20	
Cast, oval, 15 in. or longer	35⅞
Zinc, oval, 99.99	
Ball anodes	20.50
Nickel 99 pct plus	
Cast	59.00
Rolled, depolarized	60.00
Cadmium	$2.10
Silver 999 fine, rolled, 100 oz. lots, per troy oz, f.o.b. Bridgeport, Conn.	79

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum	46.00
Copper sulfate, 99.5 crystals, bbls	9.10
Nickel salts, single or double, 100 lb bags, frt. allowed	20.00
Nickel chloride, 300 lb bbl	24.50
Silver cyanide, 100 oz. lots, per oz.	59
Sodium cyanide, 96 pct domestic 100 lb drums	16.00
Zinc sulfate, crystals, 22.5 pct, bags	
Zinc sulfate, 25 pct, granules, bbls, frt allowed	

Mill Products

Aluminum

(Base prices, cents per pound, base 30,000 lb, f.o.b. shipping point, freight allowed)

Flat Sheet: 0.188 in., 2S, 3S, 26.9¢; 4S, 61S-O, 28.8¢; 52S, 30.9¢; 24S-O, 24S-OAL, 29.8¢; 75S-O, 75S-OAL, 36.3¢; 0.081 in., 2S, 3S, 27.9¢; 4S, 61S-O, 30.2¢; 52S, 32.3¢; 24S-O, 24S-OAL, 30.9¢; 75S-O, 75S-OAL, 38¢; 0.032 in., 2S, 3S, 29.5¢; 4S, 61S-O, 33.5¢; 52S, 36.2¢; 24S-O, 24S-OAL, 37.9¢; 75S-O, 75S-OAL, 47.6¢.

Plate: ¼ in. and heavier: 2S, 3S, F, 23.8¢; 4S-F, 26¢; 52S-F, 27.1¢; 61S-O, 26.6¢; 24S-F, 24S-FAL, 27.1¢; 75S-F, 75S-FAL, 33.9¢.

Extruded Solid Shapes: Shape factors 1 to 4, 35.1¢ to 66¢; 11 to 13, 36.1¢ to 78¢; 23 to 25, 38.2¢ to $1.07; 35 to 37, 45.7¢ to $1.65; 47 to 49, 67.5¢ to $2.41.

Rod, Rolled: 1.064 to 4.5 in., 2S-F, 3S-F, 34¢ to 30.5¢; Cold-finished, 0.375 to 3.5 in., 2S, 3S, 36.5¢ to 32¢.

Screw Machine Stock: Drawn, ⅛ to 11/32 in., 11S-T3, R317-T4, 49¢ to 38¢; cold-finished, ⅜ to 1½ in., 11S-T3, 37.5¢ to 35.5¢; ⅜ to 2 in., R317-T4, 37.5¢ to 34.5¢; rolled, 1 9/16 to 3 in., 11S-T3, 35.5¢ to 32.5¢; 2⅛ to 3⅜ in., R317-T4, 33.5¢ to 32.5¢. Base 5000 lb.

Drawn Wire: Coiled, 0.051 to 0.374 in.: 2S, 36¢ to 26.5¢; 52S, 44¢ to 32¢; 56S, 47¢ to 38.5¢; 17S-T4, 50¢ to 34.5¢; 61S-T4, 44.5¢ to 34¢; 75S-T6, 76¢ to 55¢.

Magnesium

(Cents per lb, f.o.b. mill, freight allowed Base quantity 30,000 lb)

Sheet and Plate: Ma, FSa, ¼ in., 54¢-56¢; 0.188 in., 56¢-58¢; B & S gage 8, 58¢-60¢; 10, 59¢-61¢; 12, 63¢-65¢; 14, 69¢-74¢; 16, 76¢-81¢; 18, 84¢-89¢; 20, 96¢-$1.01; 22, $1.22-$1.31; 24, $1.62-$1.75. Specification grade higher.

Extruded Round Rod: M, diam. in., ¼ to 0.311, 58¢; ½ to ¾, 46¢; 1¼ to 1.749, 43¢; 2½ to 5, 41¢. Other alloys higher.

Extruded Square, Hex. Bar: M, size across flats, in., ¼ to 0.311, 61¢; ½ to 0.749, 48¢; 1¼ to 1.749, 44¢; 2½ to 4, 42¢. Other alloys higher.

Extruded Solid Shapes, Rectangles: M, in weight per ft, for perimeters of less than size indicated, 0.10 to 0.11 lb. per ft, per. up to 3.5 in., 55¢; 0.22 to 0.25 lb per ft, per. up to 5.9 in., 51¢; 0.50 to 0.59 lb per ft, per. up to 8.6 in., 47¢; 1.8 to 2.59 lb per ft, per. up to 19.5 in., 44¢; 4 to 6 lb per ft, per. up to 28 in., 43¢. Other alloys higher.

Extruded Round Tubing: M, wall thickness, outside diam, in., 0.049 to 0.057, ¼ to 5/16, $1.14; 5/16 to ⅜, $1.02; ½ to ⅝, 76¢; 1 to 2 in., 65¢; 0.065 to 0.082, ⅜ to 7/16, 85¢; ⅝ to ¾, 62¢; 1 to 2 in., 57¢. 0.165 to 0.219, ⅝ to ¾, 54.5¢; 1 to 2 in., 53¢; 3 to 4 in., 49¢. Other alloys higher.

Nickel and Monel

(Base prices, cents per lb, f.o.b. mill)

	Nickel	Monel
Sheets, cold-rolled	60	47
Strip, cold-rolled	66	50
Rods and shapes		
Hot-rolled	56	45
Cold-drawn	56	45
Angles, hot-rolled	56	45
Plates	58	46
Seamless tubes	89	80
Shot and blocks	..	40

Copper, Brass, Bronze

(Cents per pound, freight prepaid on 200 lb)

	Extruded Shapes	Rods	Sheets
Copper	36.78	....	37.18
Copper, hot-rolled	....	33.03	....
Copper, drawn	....	34.28	....
Low brass	38.57*	35.35	35.66
Yellow brass	37.60*	34.28	34.59
Red brass	38.92*	35.70	36.01
Naval brass	34.90	33.65	39.59
Leaded brass	....	29.24	....
Commercial bronze	39.54*	36.57	36.88
Manganese bronze	38.49	36.99	43.09
Phosphor bronze, 5 pct	57.80*	56.30	56.05
Muntz metal	34.47	33.22	37.66
Everdur, Herculoy, Olympic, etc.	40.49	40.76	41.82
Nickel silver, 10 pct	....	47.17	44.77
Architectural bronze	33.42	....	....

* Seamless tubing.

Scrap Metals

Brass Mill Scrap

(Cents per pound; add ½¢ per lb for shipments of 20,000 lb or more)

	Heavy	Turnings
Copper	21⅛	20¾
Yellow brass	18⅞	18⅝
Red brass	20	19¼
Commercial bronze	20⅛	19⅝
Manganese bronze	18¾	17⅞
Leaded brass rod ends	18½	

Custom Smelters' Scrap

(Cents per pound, carload lots, delivered to refinery)

No. 1 copper, wire	19.50
No. 2 copper, wire	18.50
Light copper	17.50
Refinery brass	17.25-17.50

Ingot Makers' Scrap

(Cents per pound, carload lots, delivered to producer)

No. 1 copper, wire	19.00
No. 2 copper, wire	18.00
Light copper	17.00
No. 1 composition	14.00-14.25
No. 1 comp. turnings	13.75-14.00
Rolled brass	12.25-12.75
Brass pipe	13.25-13.75
Radiators	12.00-12.50
Heavy yellow brass	12.00-12.25
Aluminum	
Mixed old cast	14.25-14.50
Mixed old clips	14.25-14.75
Mixed turnings, dry	13.50-13.75
Pots and pans	14.50-15.75
Low copper	17.75-18.25

Dealers' Scrap

(Dealers' buying prices, f.o.b. New York in cents per pound)

Copper and Brass

No. 1 heavy copper and wire	17½—18
No. 2 heavy copper and wire	16½—17
Light copper	15½—16
Auto radiators (unsweated)	10½—11
No. 1 composition	12¾—13
No. 1 composition turnings	12½—12¾
Clean red car boxes	10¾—11
Cocks and faucets	10¾—11
Mixed heavy yellow brass	7¾— 8¼
Old rolled brass	10½—11
Brass pipe	11½—12
New soft brass clippings	15 —15½
Brass rod ends	11½—12
No. 1 brass rod turnings	8½— 9

Aluminum

Alum. pistons and struts	5 — 5½
Aluminum crankcases	8 — 8½
2S aluminum clippings	13 —13½
Old sheet and utensils	8 — 8½
Borings and turnings	4½— 5
Misc. cast aluminum	8 — 8
Dural clips (24S)	8 — 8

Zinc

New zinc clippings	10½—11
Old zinc	9 — 9½
Zinc routings	5¼— 5¾
Old die cast scrap	5½— 6

Nickel and Monel

Pure nickel clippings	22 —23
Clean nickel turnings	17 —18
Nickel anodes	22 —23
Nickel rod ends	21 —22
New Monel clippings	16½—17½
Clean Monel turnings	11 —12
Old sheet Monel	13 —14
Old Monel castings	11 —12
Inconel clippings	13 —14
Nickel silver clippings, mixed	8 — 8½
Nickel silver turnings, mixed	7 — 7½

Lead

Soft scrap lead	13 —14
Battery plates (dry)	7 — 7¼

Magnesium Alloys

Segregated solids	8 — 9
Castings	4½— 5½

Miscellaneous

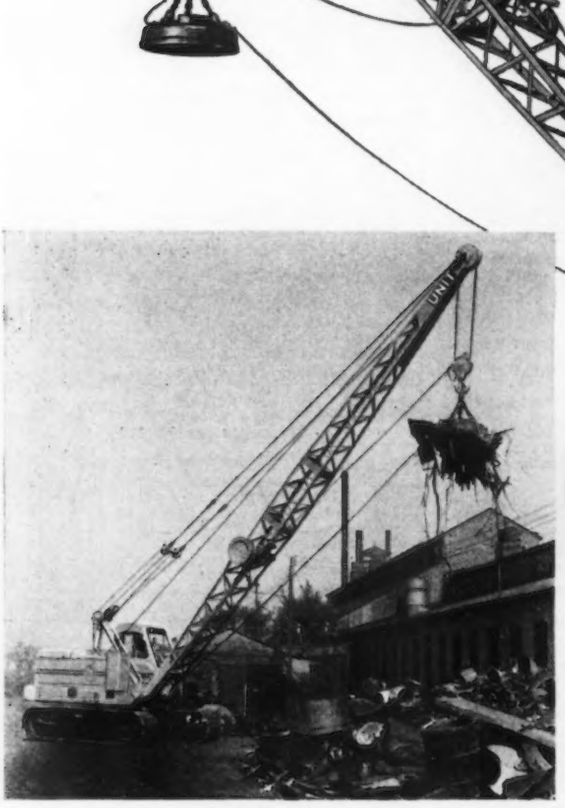
Block tin	82 —84
No. 1 pewter	65 —67
No. 1 auto babbitt	51 —53
Mixed common babbitt	14½—15
Solder joints	20 —21
Siphon tops	50 —52
Small foundry type	16 —16½
Monotype	15 —15½
Lino. and stereotype	14½—15
Electrotype	13 —13½
New type shell cuttings	15 —15½
Hand picked type shells	6 — 6½
Lino. and stereo. dross	8½— 9
Electro. dross	6 — 6½

UNIT 1020A

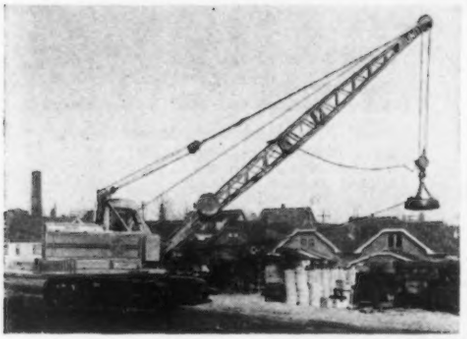
HEAVY-DUTY

The One Machine that Keeps Up with the Baler!

UNIT 1020A . . . Perfectly balanced . . . All-around stability . . . Handles a 45 inch magnet with ease.



The UNIT 1020A is designed and built for heavy-duty scrap yard operation. Extra long crawlers, wider axles and shoes, plus additional counterweight, provide perfect balance and all-around stability. Tipping strains are absorbed by hook-rollers. Owners using 45 inch magnets find them easy to handle. With full loads, there's no weaving or rocking. It has power and stability without bulk . . . fast on the hoist . . . easy on the swing. To modernize your yard — start with a UNIT 1020A.



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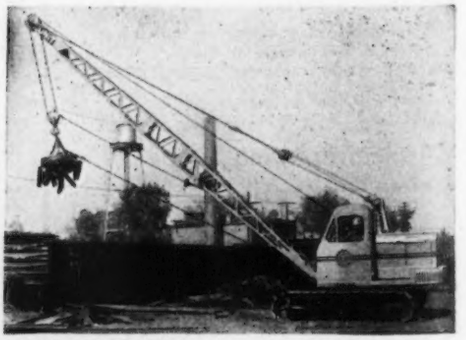
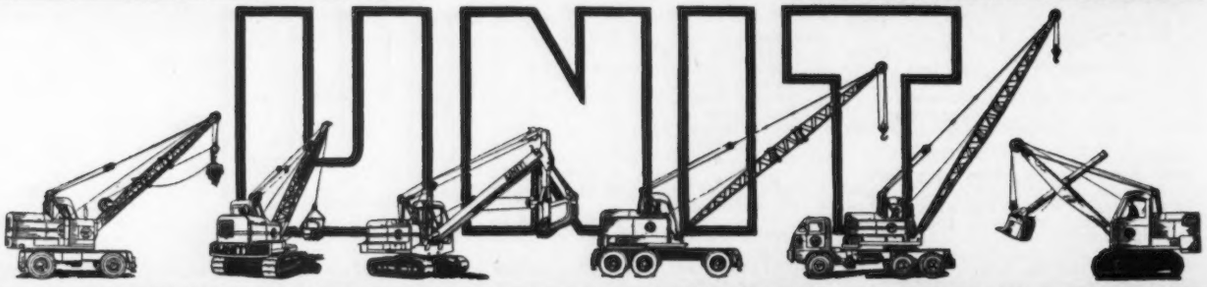
◀ Quickly convertible to hook, clamshell or magnet, the UNIT 1020A can handle every scrap yard job.

The UNIT 1020A handles heavy steel, baled or loose scrap with day-in and day-out dependability. ▶





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SCRAP

. . . News and Market Activities

Market Resumes Its Downward Trend

New York

• • • **The market,** which had shown signs of leveling off in recent weeks, resumed its downward trend this week. Decreases were scattered through all areas and all grades. Most areas averaged about $2 lower right down the line.

No. 1 heavy melting steel showed the best resistance to the lower trend. But even this item was off in most areas. It slipped $2 a gross ton in Pittsburgh, $1 in Philadelphia. In Chicago it held weakly to last week's quotation. THE IRON AGE scrap composite price, based on these markets, decreased $1 a gross ton to $36.25 a gross ton. This is the lowest composite price recorded since the middle of 1947.

In most areas other grades showed even greater weakness. Openhearth and blast furnace grades both slipped badly, with largest decreases being recorded by the latter. Turnings are generally a very weak item.

The cast grades continue their wobbly plight. These items were the first to show weakness last year and they are still showing the way—down. Foundries are continuing to liquidate inventories and there is no indication when buying in quantity will be resumed.

Big consumers are still out of the market. True, they nibble a little here and there, now and then, but none of them seem willing to bite off a sizable chunk of today's market.

Movement on old orders is still fair in some areas. Some of this business has already been cleaned up. More of it will be finished this week. Normally this would indicate that new business would be placed soon. But stocks seem more than adequate for most consumers, many of whom have suddenly become inventory conscious.

•

PITTSBURGH—On appraisal, No. 2 heavy melting steel is quotable this week at $34.50 to $35, off $2 from last week. Broker buying confirms this. No. 1 and railroad steel are also quotable at $2 less. The turnings market is demoralized. While one crusher won't pay more than $23 for machine shop and mixed borings and turnings this price applies only to distress sales and consumers will pay $25 to $26. The two biggest short shoveling turnings consumers here had shut off shipments at the beginning of the week and this grade is off $2, quotable at $27 to $28. Last week's reduction of railroad heavy melting steel to $39.50 to $40, made on appraisal, was confirmed by sales a few days later. No. 2 steel bundles have been added to the list of grades quoted here because it is possible that they will go for several dollars less than No. 2 steel, on the next sale, but so far there have been no lower priced offers. Every item on the list was off this week due to buyer resistance.

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CHICAGO—The market continued to droop last week. Dealer scrap fell another dollar and turnings are extremely weak. Brokers on the average are collecting $2 to $3 commission on what small tonnages are moving instead of 50 cents to $1. Railroad scrap does not show any signs of strength. Scrap men are all waiting for the mills to come back into the market but they predict this will probably not happen before the middle of April. Quotas are working in reverse as far as scrap goes. The mills who are still accepting customer scrap limit how much they will take back.

•

PHILADELPHIA — New orders were placed in very small tonnage in a few grades last week, but there were no new orders in most grades. Brokers' buying to cover old orders was at lower prices. The No. 1 market was off $1 a ton. No. 2 bundles were off 50¢ on the high side. Turnings are down another 50¢. There was no business in cast grades, but the extent of any possible decline is limited by current pig iron prices. Cast is reported to be finding its way into steel shipments. Steel scrap is moving, but orders are being placed sparingly. All Philadelphia yards are now operating on a 5-day week. Dealers and brokers are restive under the long continued lack of business. But yard inventories are reported to be low and dealers are generally in good financial shape.

•

CLEVELAND—Nobody is buying big tonnages here or in the Valley. Major consumers are mostly out of the market for March and perhaps longer, and one is holding up shipments in the Valley. Brokers are trying to get their buying prices down in some cases, with few orders out, mostly for small tonnages. Closing of the Pennsylvania Railroad lists will probably prove a barometer of the market, but the fact remains that some converters have a lot of specialties they want their brokers to move which is depressing the market for higher grade material.

DETROIT — Scrap prices are still tumbling here with local mills back into the market for March at $32, delivered, for openhearth grades, except No. 1 bundles. The entire scrap list is down again this week on the basis of the latest buying and there are no indications that a price bottom has been found. Turnings and foundry grades are especially weak. Some sources predict that openhearth grades are slated to go to still lower levels before price stabilization is reached here.

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NEW YORK — This market is sick. Prices have slipped again. Latest declines range from $1 to $4 per gross ton. Even No. 1 heavy melting could not resist the trend. It was pulled down $1 a ton. But these decreases were in dealer's buying prices. Consumers are still out of the market—new business is practically nonexistent. Movement was fair on old orders, but some brokers report this will be pretty well cleaned up this week.

•

CINCINNATI — Little business and lower prices have toned the market here down to a whisper. Consumers are putting orders out for small tonnages, usually at $2 under the last price paid, a practice which has become the current pattern here. Brokers are moving very carefully, and trying to make the small orders pay off. Scrap is moving into yards here rather irregularly, and rumors of a layoff of yard help in a nearby district have the trade pretty well subdued.

•

BOSTON—Brokers in many cases refuse to quote prices and one said "I wouldn't give a dime for it." No. 1 heavy melting may have hit its bottom at $29, according to some observers. If so, it is after a long slide down from more than $40.

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ST. LOUIS—No. 2 heavy melting held its own in the St. Louis market this week, although buying by the mills was limited. There was no demand for other items and most of them continued to decline.

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BUFFALO—Practically everything on the list sagged at least a dollar this week in the absence of worthwhile buying. Two railroads sold their No. 1 heavy melting at $40, confirming the lower trend, and one of the leading mills held up shipments on blast furnace scrap, which didn't help matters. Railroad malleable was reported awarded at $34 and $37 compared with a nominal quotation of $60 to $65 recently. Cast grades slumped $4 to $5. A new development in this market was an attempt to establish differentials between production and dealer scrap.

•

BIRMINGHAM—Scrap prices here have dropped again with No. 1 and No. 2 heavy melting steel down $3.50 per ton and the differential for No. 2 bundles being extended to $2 from the former $1.50. The price weakness is general, with the reductions based on limited trading. Both mills and foundries continue to liquidate inventories and there is no indication when buying in quantity will be resumed.

Going prices as obtained in the trade by THE IRON AGE, based on representative tonnages.

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. melting	$36.50 to $37.00
RR. hvy. melting	37.50 to 38.00
No. 2 hvy. melting	34.50 to 35.00
No. 2 bundles	34.50 to 35.00
RR. scrap rails	43.00 to 44.00
Rails 2 ft and under	47.00 to 48.00
No. 1 comp'd bundles	36.50 to 37.00
Hand bdld. new shts.	36.50 to 37.00
Hvy. steel forge turn.	35.50 to 36.00
Mach. shop turn.	25.00 to 26.00
Shoveling turn.	27.00 to 28.00
Mixed bor. and turn.	25.00 to 26.00
Cast iron borings	27.00 to 28.00
No. 1 mach. cast.	45.00 to 46.00
Mixed yard cast.	38.00 to 39.00
Hvy. breakable cast.	35.00 to 36.00
Malleable	51.00 to 52.00
RR. knuck. and cup	45.00 to 46.00
RR. coil springs	45.00 to 46.00
RR. leaf springs	45.00 to 46.00
Rolled steel wheels	45.00 to 46.00
Low phos.	42.00 to 43.00

CHICAGO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$34.00 to $35.00
No. 2 hvy. melting	30.00 to 31.00
No. 1 bundles	34.00 to 35.00
No. 2 dealers' bundles	29.00 to 30.00
Bundled mach. shop turn.	24.00 to 27.00
Galv. bundles	26.00 to 27.00
Mach. shop turn.	21.00 to 23.00
Short shov. turn.	21.00 to 23.00
Cast iron borings	21.00 to 23.00
Mix. borings and turn.	21.00 to 23.00
Low phos. hvy. forge	40.00 to 41.00
Low phos. plates	37.00 to 39.00
No. 1 RR. hvy. melt.	35.00 to 37.00
Rerolling rails	42.50 to 43.25
Miscellaneous rails	38.00 to 39.00
Angles & splice bars	40.00 to 41.00
Locomotive tires, cut	42.00 to 43.00
Cut bolster & side frames	39.00 to 40.00
Standard stl. car axles	56.00 to 58.00
No. 3 steel wheels	41.00 to 42.00
Couplers and knuckles	40.00 to 41.00
Rails, 3 ft and under	42.00 to 44.00
Malleable	40.00 to 41.00
No. 1 mach. cast.	41.00 to 42.00
No. 1 agricul. cast.	38.00 to 40.00
Heavy breakable cast	35.00 to 38.00
RR. grate bars	29.00 to 30.00
Cast iron brake shoes	30.00 to 31.00
Cast iron car wheels	38.00 to 40.00

CINCINNATI

Per gross ton, f.o.b. cars:

No. 1 hvy. melting	$30.00 to $31.00
No. 2 hvy. melting	27.00 to 28.00
No. 1 bundles	30.00 to 31.00
No. 2 bundles	28.00 to 29.00
Mach. shop turn.	20.00 to 21.00
Shoveling turn.	21.00 to 22.00
Cast iron borings	21.00 to 22.00
Mixed bor. & turn.	20.00 to 21.00
Low phos. 18 in. under	37.00 to 38.00
No. 1 cupola cast.	40.00 to 42.00
Hvy. beakable cast.	34.00 to 36.00
Rails 18 in. and under	44.50 to 46.50
Rails random length	36.00 to 38.00
Drop broken	44.00 to 45.00

BOSTON

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	$29.00
No. 2 hvy. melting	$25.00 to 26.00
No. 1 bundles	27.50
No. 2 bundles	24.50 to 26.00
Bushelings	24.50 to 26.00
Shoveling turn.	23.00
Machine shop turn.	19.50 to 20.50
Mixed bor. and turn.	19.50 to 20.50
Cl'n cast chem. bor.	28.00 to 29.00
No. 1 machinery cast.	33.50 to 34.50
No. 2 machinery cast.	30.50 to 32.50
Heavy breakable cast.	27.50 to 29.00
Stove plate	27.50 to 29.00

DETROIT

Per gross ton, brokers' buying prices f.o.b. cars:

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	27.00 to 28.00
No. 1 bundles	32.00 to 34.00
New busheling	29.00 to 30.00
Flashings	29.00 to 30.00
Mach. shop turn.	18.00 to 19.00
Machinery cast.	37.00 to 38.00
Mixed yard cast.	36.00 to 37.00
Shoveling turn.	19.00 to 20.00
Cast iron borings	18.00 to 19.00
Mixed bor. & turn.	18.00 to 19.00
Low phos. plate	33.00 to 34.00
Heavy breakable cast.	32.00 to 34.00
Stove plate	33.00 to 34.00
Automotive cast.	37.00 to 38.00

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. melting	$37.00 to $38.00
No. 2 hvy. melting	33.00 to 34.00
No. 1 bundles	37.00 to 38.00
No. 2 bundles	31.00 to 31.50
Mach. shop turn.	29.50 to 30.00
Shoveling turn.	30.50 to 31.00
Mixed bor. and turn.	29.50 to 30.00
Clean cast chemical bor.	33.00 to 36.00
No. 1 machinery cast.	41.00 to 43.00
No. 1 mixed yard cast.	39.00 to 40.00
Hvy. breakable cast.	39.00 to 40.00
Hvy. axle forge turn.	37.00 to 38.00
Low phos. acid openhearth	40.00 to 41.00
Low phos. electric furnace	40.00 to 41.00
Low phos. bundles	38.00 to 39.00
RR. steel wheels	42.00 to 43.00
RR. coil springs	42.00 to 43.00
RR. malleable	38.00 to 40.00
Cast iron carwheels	46.00 to 47.00

ST. LOUIS

Per gross ton delivered to consumer:

No. 1 hvy. melting	$30.00 to $31.00
No. 2 hvy. melting	28.00 to 29.00
Bundled sheets	28.00 to 29.00
Mach. shop turn.	20.00 to 22.00
Shoveling turnings	20.00 to 22.00
Locomotive tires, uncut	38.00 to 39.00
Mis. std. sec. rails	35.00 to 36.00
Steel angle bars	40.00 to 42.00
Rails 3 ft and under	40.00 to 42.00
RR. steel springs	40.00 to 41.00
Steel car axles	50.00 to 51.00
Brake shoes	30.00 to 31.00
Malleable	35.00 to 37.00
Cast iron car wheels	40.00 to 41.00
No. 1 machinery cast.	40.00 to 41.00
Hvy. breakable cast.	33.00 to 34.00

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting	$29.00
No. 2 hvy. melting	29.00
No. 2 bundles	27.00
No. 1 busheling	29.00
Long turnings	22.00
Shoveling turnings	24.00
Cast iron borings	24.00
Bar crops and plate	25.00
Structural and plate	35.00
No. 1 cupola cast.	$41.00 to 42.00
Stove plate	38.00 to 39.00
No. 1 RR. hvy. melt.	32.50
Steel axles	45.00 to 47.00
Scrap rails	37.00 to 38.00
Rerolling rails	41.00 to 43.00
Angles & splice bars	40.00 to 42.00
Rails 3 ft & under	40.00 to 42.00
Cast iron carwheels	39.00 to 40.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. melting	$36.50 to $37.00
No. 2 hvy. melting	34.50 to 35.00
No. 1 bundles	36.50 to 37.00
No. 2 bundles	34.50 to 35.00
Mach. shop turn.	25.00 to 26.00
Short shov. turn.	26.00 to 27.00
Cast iron borings	26.00 to 27.00
Low phos.	41.00 to 42.00

NEW YORK

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	$28.00 to $29.00
No. 2 hvy. melting	25.00 to 26.00
No. 2 bundles	24.00 to 26.00
Mach. shop turn.	17.00 to 19.00
Mixed bor. & turn.	17.00 to 19.00
Shoveling turnings	20.00 to 21.00
Machinery cast.	35.00 to 36.00
Mixed yard cast.	33.00 to 34.00
Heavy breakable cast.	31.00 to 32.00
Charging box cast.	31.00 to 32.00
Unstrp. motor blks.	30.00 to 31.00
Cl'n cast chem. bor.	29.50 to 30.50

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$37.00 to $38.00
No. 2 hvy. melting	33.00 to 34.00
No. 1 bundles	33.00 to 34.00
No. 2 bundles	30.00 to 31.00
No. 1 busheling	33.00 to 34.00
Mach. shop turn.	25.00 to 26.00
Shoveling turn.	27.00 to 28.00
Cast iron borings	25.00 to 26.00
Mixed bor. and turn.	25.00 to 26.00
Clean auto. cast.	42.00 to 44.00
Mixed yard cast.	34.00 to 35.00
Stove plate	34.00 to 35.00
RR. malleable	34.00 to 37.00
Small indus. malleable	34.00 to 35.00
Low phos. plate	39.50 to 40.50
Scrap rails	47.00
Rails 3 ft & under	49.00 to 51.00
RR. steel wheels	45.00 to 46.00
RR. coil & leaf spgs.	45.00 to 46.00
RR. knuckles & coup.	45.00 to 46.00

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. melting	$36.00 to $36.50
No. 2 hvy. melting	34.00 to 34.50
No. 1 bundles	34.00 to 34.50
No. 1 busheling	34.00 to 34.50
Drop forge flashings	34.00 to 34.50
Mach. shop turn.	23.00 to 23.50
Shoveling turn.	25.00 to 26.00
Steel axle turn.	31.00 to 31.50
Cast iron borings	25.00 to 26.00
Mixed bor. & turn.	25.00 to 26.00
Low phos. 2 ft and under	39.00 to 40.00
No. 1 mach. cast.	44.00 to 45.00
Malleable	40.00 to 42.00
RR. cast.	44.00 to 45.00
Railroad grate bars	40.00 to 41.00
Stove plate	40.00 to 41.00
RR. hvy. melting	41.00 to 41.50
Rails 3 ft and under	48.00 to 50.00
Rails 18 in. and under	49.00 to 51.00

SAN FRANCISCO

Per gross ton, f.o.b. shipping point:

No. 1 hvy. melting	$25.00
No. 2 hvy. melting	25.00
No. 1 bales	23.00
No. 2 bales	23.00
No. 3 bales	20.00
Mach. shop turn.	15.00
Elec. fur. 1 ft under	$37.50 to 40.00
No. 1 cupola cast.	38.00 to 42.00
RR. hvy. melting	26.00
Rails	26.50

LOS ANGELES

Per gross ton, f.o.b. shipping point:

No. 1 hvy. melting	$25.00
No. 2 hvy. melting	25.00
No. 1 bales	23.00
No. 2 bales	23.00
No. 3 bales	20.00
Mach. shop turn.	15.00
Elec. fur. 1 ft. under	$32.00 to 38.00
No. 1 cupola cast.	38.00 to 42.00
RR. hvy. melting	26.00

SEATTLE

Per gross ton delivered to consumer:

No. 1 & No. 2 hvy. melt.	$25.00
Elec. fur. 1 ft. and under	36.00
No. 1 cupola cast.	$40.00 to 45.00
RR. hvy. melting	26.00

HAMILTON, ONT.

Per gross ton delivered to consumer: Cast grades f.o.b. shipping point:

Heavy melting	$23.00*
No. 1 bundles	23.00*
No. 2 bundles	22.50*
Mechnical bundles	21.00*
Mixed steel scrap	19.00*
Mixed borings and turnings	17.00*
Rails, remelting	23.00*
Rails, rerolling	26.00*
Bushelings	17.50*
Bushelings, new fact, prop'd	21.00*
Bushelings, new fact, unprop'd	16.00*
Short steel turnings	17.00*
No. 1 cast.	$48.00 to 50.00*
No. 2 cast.	44.00 to 45.00*

*Ceiling Price.

For the Purchase or Sale of

Iron and Steel Scrap . . .

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LEADERS IN IRON AND STEEL SCRAP SINCE 1889

Comparison of Prices . .

Price advances over previous week are printed in Heavy Type; declines appear in *Italics*.

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Flat-Rolled Steel: (cents per pound)	Mar. 8, 1949	Mar. 1, 1949	Feb. 8, 1949	Mar. 9, 1948
Hot-rolled sheets	3.26	3.26	3.26	2.80
Cold-rolled sheets	4.00	4.00	4.00	3.55
Galvanized sheets (10 ga)	4.40	4.40	4.40	3.95
Hot-rolled strip	3.265	3.265	3.265	2.80
Cold-rolled strip	4.063	4.063	4.063	3.55
Plates	3.42	3.42	3.42	2.95
Plates wrought iron	7.85	7.85	7.85	7.25
Stains C-R strip (No. 302)	33.25	33.25	33.25	30.50
Tin and Terneplate: (dollars per base box)				
Tinplate (1.50 lb) cokes	$7.75	$7.75	$7.75	$6.80
Tinplate, electro (0.50 lb)	6.70	6.70	6.70	6.00
Special coated mfg. ternes	6.65	6.65	6.65	5.90
Bars and Shapes: (cents per pound)				
Merchant bars	3.37	3.37	3.37	2.90
Cold-finished bars	3.995	3.995	3.995	3.55
Alloy bars	3.75	3.75	3.75	3.30
Structural shapes	3.25	3.25	3.25	2.80
Stainless bars (No. 302)	28.50	28.50	28.50	26.00
Wrought iron bars	9.50	9.50	9.50	8.65
Wire: (cents per pound)				
Bright wire	4.194	4.194	4.256	3.55
Rails: (dollars per 100 lb)				
Heavy rails	$3.20	$3.20	$3.20	$2.75
Light rails	3.55	3.55	3.55	3.10
Semifinished Steel: (dollars per net ton)				
Rerolling billets	$52.00	$52.00	$52.00	$45.00
Slabs, rerolling	52.00	52.00	52.00	45.00
Forging billets	61.00	61.00	61.00	54.00
Alloy blooms, billets, slabs	63.00	63.00	63.00	66.00
Wire rod and Skelp: (cents per pound)				
Wire rods	3.619	3.619	3.619	2.80
Skelp	3.25	3.25	3.25	2.90

Pig Iron: (per gross ton)	Mar. 8, 1949	Mar. 1, 1949	Feb. 8, 1949	Mar. 9, 1948
No. 2, foundry, Phila.	$51.56	$51.56	$51.56	$44.61
No. 2, Valley furnace	46.50	46.50	46.50	39.50
No. 2, Southern Cin'ti*	49.46	49.46	49.46	43.28
No. 2, Birmingham	43.38	43.38	43.38	37.38
No. 2, foundry, Chicago†	46.00	46.00	46.00	39.00
Basic del'd Philadelphia*	50.76	50.76	50.76	44.11
Basic, Valley furnace	46.00	46.00	46.00	39.00
Malleable, Chicago†	46.50	46.50	46.50	39.50
Malleable, Valley	46.50	46.50	46.50	39.50
Charcoal, Chicago	73.78	73.78	73.78	62.46
Ferromanganese‡	161.40	161.40	161.40	145.00

† The switching charge for delivery to foundries in the Chicago district is $1 per ton.
‡ Average of U. S. prices quoted on Ferroalloy page.
* Does not include interim increase on total freight charges, effective Jan. 11, 1949.

Scrap (per gross ton)				
Heavy melt'g steel, P'gh.	*$36.75*	$38.75	$38.75	$40.25
Heavy melt'g steel, Phila.	*37.50*	38.50	39.50	40.00
Heavy melt'g steel, Ch'go	34.50	34.50	34.50	39.00
No. 1, hy. comp. sh't, Det.	*33.00*	34.00	32.50	35.50
Low phos. Young'n	*41.50*	43.50	45.25	45.25
No. 1, cast, Pittsburgh	*45.50*	49.00	58.50	61.00
No. 1, cast, Philadelphia	*42.00*	44.00	46.00	65.50
No. 1, cast, Chicago	*41.50*	43.50	49.00	69.00
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.50	$14.50	$15.25	$12.50
Foundry coke, prompt	16.50	16.50	16.75	14.00
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electro, Conn.	23.50	23.50	23.50	21.50
Copper, Lake Conn.	23.625	23.625	23.625	21.625
Tin, Grade A, New York	$1.03	$1.03	$1.03	94.00
Zinc, East St. Louis	17.50	17.50	17.50	12.00
Lead, St. Louis	21.30	21.30	21.30	14.80
Aluminum, virgin	17.00	17.00	17.00	15.00
Nickel, electrolytic	42.93	42.93	42.90	36.56
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	38.50	38.50	38.50	33.00

Composite Prices . .

Starting with the issue of Apr. 22, 1943, the weighted finished steel index was revised for the years 1941, 1942, and 1943. See explanation of the change on p. 90 of the Apr. 22, 1943, issue. Index revised to a quarterly basis as of Nov. 16, 1944; for details see p. 98 of that issue. The finished steel composite price for the current quarter is an estimate based on finished steel shipments for the previous quarter. This figure will be revised when shipments for this quarter are compiled.

	FINISHED STEEL (Base Price)	PIG IRON	SCRAP STEEL
Mar. 8, 1949	3.75434¢ per lb.	$46.74 per gross ton	*$36.25* per gross ton
One week ago	3.75434¢ per lb.	$46.74 per gross ton	$37.25 per gross ton
One month ago	3.75628¢ per lb.	$46.74 per gross ton	$37.58 per gross ton
One year ago	3.27585¢ per lb.	$40.37 per gross ton	$39.75 per gross ton

	FINISHED STEEL HIGH	FINISHED STEEL LOW	PIG IRON HIGH	PIG IRON LOW	SCRAP STEEL HIGH	SCRAP STEEL LOW
1949	3.75628¢ Jan. 1	3.75434¢ Feb. 22	$46.82 Jan. 4	$46.74 Jan. 25	$43.00 Jan. 1	$36.25 Mar. 8
1948	3.75700¢ July 27	3.22566¢ Jan. 1	46.91 Oct. 12	39.58 Jan. 6	43.16 July 27	39.75 Mar. 9
1947	3.19541¢ Oct. 7	2.87118¢ Jan. 7	37.98 Dec. 30	30.14 Jan. 7	42.58 Oct. 28	29.50 May 20
1946	2.83599¢ Dec. 31	2.54490¢ Jan. 1	30.14 Dec. 10	25.37 Jan. 1	31.17 Dec. 24	19.17 Jan. 1
1945	2.44104¢ Oct. 2	2.54490¢ Jan. 2	25.37 Oct. 23	23.61 Jan. 2	19.17 Jan. 2	18.92 May 22
1944	2.30837¢ Sept. 5	2.21189¢ Oct. 5	$23.61	$23.61	19.17 Jan. 11	15.76 Oct. 24
1943	2.29176¢	2.29176¢	23.61	23.61	$19.17	$19.17
1942	2.28249¢	2.28249¢	23.61	23.61	19.17	19.17
1941	2.43078¢	2.43078¢	$23.61 Mar. 20	$23.45 Jan. 2	$22.00 Jan. 7	$19.17 Apr. 10
1940	2.30467¢ Jan. 2	2.24107¢ Apr. 16	23.45 Dec. 23	22.61 Jan. 2	21.83 Dec. 30	16.04 Apr. 9
1939	2.35367¢ Jan. 3	2.26689¢ May 16	22.61 Sept. 19	20.61 Sept. 12	22.50 Oct. 3	14.08 May 16
1938	2.58414¢ Jan. 4	2.27207¢ Oct. 18	23.25 June 21	19.61 July 6	15.00 Nov. 22	11.00 June 7
1937	2.58414¢ Mar. 9	2.32263¢ Jan. 4	23.25 Mar. 9	20.25 Feb. 16	21.92 Mar. 30	12.67 June 9
1936	2.32263¢ Dec. 28	2.05200¢ Mar. 10	19.74 Nov. 24	18.73 Aug. 11	17.75 Dec. 21	12.67 June 8
1935	2.07642¢ Oct. 1	2.06492¢ Jan. 8	18.84 Nov. 5	17.83 May 14	13.42 Dec. 10	10.33 Apr. 29
1934	2.15367¢ Apr. 24	1.95757¢ Jan. 2	17.90 May 1	16.90 Jan. 27	13.00 Mar. 13	9.50 Sept. 25
1933	1.95578¢ Oct. 3	1.75836¢ May 2	16.90 Dec. 5	13.56 Jan. 3	12.25 Aug. 8	6.75 Jan. 3
1932	1.89196¢ July 5	1.83901¢ Mar. 1	14.81 Jan. 5	13.56 Dec. 6	8.50 Jan. 12	6.43 July 5
1931	1.99626¢ Jan. 13	1.86586¢ Dec. 29	15.90 Jan. 6	14.79 Dec. 15	11.33 Jan. 6	8.50 Dec. 29
1929	2.31773¢ May 28	2.26498¢ Oct. 29	18.71 May 14	18.21 Dec. 17	17.58 Jan. 29	14.08 Dec. 8

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing major portion of finished steel shipments. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Fifty years of service

1899—1949

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Iron and Steel Prices . . .

Steel prices shown here are f.o.b. producing points in cents per pound unless otherwise indicated. Extras apply. (1) Commercial quality sheet grade; prices, 0.25¢ above base. (2) Commercial quality grade. (3) Widths up to 12-in. inclusive. (4) 0.25 carbon and less. (5) Cokes, 1.25 lb, deduct 25¢ per base box. (6) 18 gage and heavier. (7) For straight length material only from producers to fabricators. (8) Also shafting. For quantities of 40,000 lb and over. (9) Carload lot in manufacturing trade. (10) Hollowware enameling, gages 29 to 31 only. (11) Produced to dimensional tolerances in AISI Manual Sec. 6. (12) Slab prices subject to negotiation in most cases. (13) San Francisco only. (14) Los Angeles only. (15) San Francisco and Los Angeles only. (16) Seattle only. (17) Seattle and Los Angeles only.

PRODUCTS	Base prices at producing points apply to the sizes and grades produced in these areas														
	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio		Detroit	Johnstown	Seattle, S. Frisco, LosAngeles	Fontana
INGOTS Carbon forging	$50.00														
Alloy	$51.00						(per net ton)								
BILLETS, BLOOMS, SLABS Carbon, rerolling[12]	$52.00				$52.00	$52.00	(per net ton)						$52.00		
Carbon forging billets	$61.00	$61.00	$61.00	$61.00	$61.00	$61.00	(per net ton)						$61.00		
Alloy	$63.00	$63.00				$63.00	(Bethlehem, Canton, Massillon = $63.00) (per net ton)								
PIPE SKELP	3.25						3.25				Warren =3.25				
WIRE RODS	3.40 to 4.15	3.40 to 3.90		3.40	3.40		3.65	3.50			Worcester 3.70		3.40	4.05[13] 4.10[14]	
SHEETS Hot-rolled[6]	3.25 to 3.30	3.25	3.25	3.25-3.30	3.25	3.25	3.25	3.25		Warren, Ashland =3.25		3.45		3.95[15]	5.65
Cold-rolled[1]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.20	4.00	Warren 4.00	4.20		Pittsburg, Cal. 4.95	
Galvanized (10 gage)	4.40	4.40	4.40		4.40			4.40	Canton =4.40	4.40	Ashland =4.40			5.15[15]	
Enameling (12 gage)	4.40	4.40	4.40	4.40			4.40		4.60	4.40		4.70			
Long ternes[2] (10 gage)	4.80		4.80							4.80					
STRIP Hot-rolled[3]	3.25 to 3.30	3.25 to 3.30	3.25	3.25 to 3.30	3.25	3.25	3.25	3.25		3.25	Warren =3.25	3.45		4.00 to 4.25	5.90
Cold-rolled[4]	4.00	4.25		4.00		4.00	4.00	4.00		New Haven 4.50 Warren =4.00 to 4.25		4.20 to 4.50			7.10
TINPLATE Cokes, 1.50 lb.[5] base box	$7.75	$7.75	$7.75		$7.85			$7.85	$7.95	Warren, Ohio =$7.75				Pittsburg, Cal. =$8.50	
Electrolytic 0.25, 0.50, 0.75 lb. box	Deduct $1.30, $1.05 and 75¢ respectively from 1.50 lb. coke base box price														
TERNES MFG., special coated	Deduct $1.10 from 1.50 lb. coke base box price														
BLACKPLATE CANMAKING 55 to 128 lb.	Deduct $2.00 from 1.50 lb. coke base box price														
BLACKPLATE, h.e., 29 ga.[10]	5.30	5.30	5.30					5.40		Warren, Ohio =5.30					
BARS Carbon Steel	3.35 to 3.55	3.35	3.35	3.35	3.35	3.35	3.35	3.35		3.35	Canton =3.35	3.55	3.35	4.05 to 4.10	5.30
Reinforcing (billet)[7]	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35			Canton =3.35		3.35	4.05 to 4.10	5.30
Cold-finished[8]	3.95 to 4.00	4.00	4.00	4.00		4.00	4.00					4.30			
Alloy, hot-rolled	3.75	3.75	3.75			3.75	3.75	Bethlehem, Canton, Massillon =3.75				4.05	3.75	4.80[14]	4.75
Alloy cold-drawn	4.65 to 4.75	4.65	4.65	4.65		4.65	4.65	Massillon =4.65			Worcester 4.95				
PLATE Carbon steel[11]	3.40 to 3.60	3.40	3.40	3.40 to 3.60	3.40	3.45	3.40 =3.95	3.45 Coatesville =3.75, Claymont =3.95 Geneva =3.40, Harrisburg =6.50				3.65	3.45	4.30[16]	5.80
Floor plates	4.55	4.55		4.55		Cons hohocken		Cons hohocken =4.55							
Alloy	4.40	4.40							Coatesville =5.10						
SHAPES, Structural	3.25 to 3.30	3.25	3.25		3.25	3.30	Bethlehem =3.30, Geneva, Utah =3.25						3.30	3.85 to 4.30	5.75
MANUFACTURERS' WIRE[9] Bright	4.15 to 4.50	4.15		4.15	4.15		4.15	4.25	Duluth =4.15, Worcester =4.45				4.15	5.15[13]	
Spring (high carbon)	5.20	5.20		5.20				5.30	Worcester =5.50 New Haven, Trenton =5.50				5.20	Duluth = 5.20-6.15	
PILING, Steel sheet	4.05	4.05				4.05									

STAINLESS STEELS

Base prices, in cents per pound, f.o.b. producing point

Product	Chromium Nickel						Straight Chromium		
	301	302	303	304	316	347	410	416	430
Ingots, rerolling	12.75	13.50	15.00	15.50	22.75	20.00	11.25	13.75	11 50
Slabs, billets, rerolling	17.00	18.25	20.25	19.25	30.25	26.75	15.00	18 50	15.25
Forging discs, die blocks, rings	30.50	30.50	33.00	32.00	49.00	41.00	24.50	25.00	25.00
Billets, forging	24.25-26.50	24.25-26.50	26.25-28.75	25.50-27 75	39.00-42.75	32.75-35.75	19.50-21.50	20.00-21.75	20.00-21.75
Bars, wire, structurals	28.50	28.50	31.00	30.00	46.00	38.50	23.00	23.50	23.50
Plates	32.00	32.00	34.00	34.00	50.50	44.00	26 00	26.50	26 50
Sheets	37.50-40.75	37.50-40.75	39.50-43 00	39.50-43.00	53.00-57.25	50.00-54.00	33.00	33.50	35.50
Strip, hot-rolled	24.25	25.75	30.00	27.75	46.00	38.75	21.25	28.00	21.75
Strip, cold-rolled	30.50-30.75	33.00-33.50	36.50-39.50	35.00-35.75	55.00-57.25	48.50-50.00	27.00	33.50	27.50

ELECTRODES

Cents per lb. f.o.b. plant, threaded electrodes with nipples, unboxed

Diameter in in.	Length in in.	
Graphite		
17, 18, 20	60, 72	16.00¢
8 to 16	48, 60, 72	16.50¢
7	48, 60	17.75¢
6	48, 60	19.00¢
4, 5	40	19.50¢
3	40	20.50¢
2½	24, 30	21.00¢
2	24, 30	23.00¢
Carbon		
40	100, 110	7.50¢
35	65, 110	7.50¢
30	65, 84, 110	7.50¢
24	72 to 104	7.50¢
17 to 20	84, 90	7.50¢
14	60, 72	8.00¢
10, 12	60	8.25¢
8	60	8.50¢

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	Base per lb
18	4	1	—	—	90.5¢
18	4	1	—	5	$1.42
18	4	2	—	—	$1.025
1.5	4	1.5	8	—	65¢
6	4	2	6	—	69.5¢

High-carbon-chromium ..... 52¢
Oil hardened manganese ..... 29¢
Special carbon ..... 26.5¢
Extra carbon ..... 22¢
Regular carbon ..... 19¢

Warehouse prices on and east of Mississippi are 2½¢ per lb higher. West of Mississippi, 4½¢ higher.

ELECTRICAL SHEETS

24 gage, HR cut lengths, f.o.b. mill

	Cents per lb
Armature	5.45 to 6.05
Electrical	5.95 to 6.55
Motor	6.70 to 6.95
Dynamo	7.50 to 7.75
Transformer 72	8.05 to 10.05
Transformer 65	8.60 to 10.60
Transformer 58	9.30 to 11.30
Transformer 52	10.10 to 11.35

RAILS, TRACK SUPPLIES

F.o.b. mill

Standard rails, 100 lb and heavier, No. 1 quality, per 100 lb ..... $3.20†
Joint bars, 100 lb 4.25
Light rails (from billets) per 100 lb 3.55

	Base Price cents per lb
Track spikes	5.35
Axles	5.20
Screw spikes	8.00
Tie plates	4.05
Tie plates, Pittsburgh, Calif.*	4.20
Track bolts, untreated	8.25
Track bolts, heat treated, to railroads	8.50

*Seattle, add 30¢.
†CF&I and Inland, $3.50.

C-R SPRING STEEL

Base per pound f.o.b. mill

0.26 to 0.40 carbon ..... 4.00¢
0.41 to 0.60 carbon ..... 5.50¢
0.61 to 0.80 carbon ..... 6.10¢
0.81 to 1.05 carbon ..... 8.05¢
1.06 to 1.35 carbon ..... 10.35¢
Worcester, add 0.30¢.

CLAD STEEL

Base prices, cents per pound

	Plate	Sheet
Stainless clad		
No. 304, 20 pct, f.o.b. Coatesville, Pa.	*26.50	
Washington, Pa.	*26.50	*22.50
Claymont, Del.	*26.50	
Conshohocken, Pa.		*22.50
Nickel-clad		
10 pct f.o.b. Coatesville, Pa.	27.50	
Inconel-clad		
10 pct, f.o.b. Coatesville.	36.00	
Monel-clad		
10 pct, f.o.b. Coatesville.	29.00	
Aluminized steel sheets		
Hot dip, 20 gage, f.o.b. Butler, Pa.		9.25

* Includes annealing and pickling, or sandblasting.

MERCHANT WIRE PRODUCTS

To the dealer, f.o.b. mill

	Base Column Pittsburg, Calif.
Standard & coated nails*	103 123
Galvanized nails*	103 123
Woven wire fence†	109 132
Fence posts, carloads††	114 ...
Single loop bale ties	106 130
Galvanized barbed wire**	123 143
Twisted barbless wire	123 ...

* Pgh., Chi., Duluth; Worcester, 6 columns higher. † 15½ gage and heavier. ** On 80 rod spools, in carloads. †† Duluth only.

	Base per 100 lb	Pittsburg, Calif.
Annealed fence wire‡	$4.80	$5.75
Annealed, galv. fencing‡	5.25	6.20
Cut nails, carloads‡‡	6.75	...

‡ Add 30¢ at Worcester; 10¢ at Sparrows Pt.
‡‡ Less 20¢ to jobbers.

HIGH STRENGTH, LOW ALLOY STEELS

Mill base prices, cents per pound

Steel	Aldecor	Corten	Double Strength No. 1	Dynalloy	HI Steel	Mayari R	Otiscoloy	Yoloy	NAX High Tensile
Producer	Republic	Carnegie-Illinois, Republic	Republic	Alan Wood	Inland	Bethlehem	Jones & Laughlin	Youngstown Sheet & Tube	Great Lakes Steel
Plates	5.20	5.20	5.20	5.30	5.20	5.30	5.20	5.40	5.65
Sheets									
Hot-rolled	4.95	4.95	4.95	5.25	4.95	4.95	4.95	5.15	5.25
Cold-rolled	6.05	6.05	6.05	.....	6.05	6.05	6.05	6.25	6.35
Galvanized	.....	6.75	.....	.....	.....	6.75	.....	.....	.....
Strip									
Hot-rolled	4.95	4.95	4.95	.....	4.95	4.95	4.95	5.15	5.25
Cold-rolled	.....	.....	6.05	.....	.....	6.05	6.05	.....	6.35
Shapes	.....	4.95	.....	.....	4.95	5.05	4.95	.....	.....
Beams	.....	4.95	.....	.....	.....	.....	.....	.....	.....
Bars									
Hot-rolled	5.10	5.10	5.10	.....	5.10	5.10	5.10	.....	5.40
Bar shapes	.....	5.10	.....	.....	5.10	5.10	5.10	.....	.....

PIPE AND TUBING

Base discounts, f.o.b. mills, Base price, $200.00 per net ton.

STANDARD, THREADED AND COUPLED

	Black	Galv.
Steel, buttweld		
⅛-in.	43 to 41	20 to 18
¼-in.	46 to 44	24 to 22
⅜-in.	48½ to 46½	27 to 25
1¼-in.	49 to 47	27½ to 25½
1½-in.	49½ to 47½	28 to 26
2-in.	50 to 48	28½ to 26½
2½ to 3-in.	50½ to 49½	29 to 27
Steel, lapweld		
2-in.	39½	17½
2½ to 3-in.	39½	21½
3½ to 6-in.	46½ to 42	20½ to 24½
Steel, seamless		
2-in.	38½ to 27	16½ to 5
2½ to 3-in.	41½ to 35	19½ to 10½
3½ to 6-in.	43½ to 38½	21½ to 16½
Wrought Iron, buttweld		
⅛-in.	+30½	+52½
¼-in.	+10½	+41½
1 & 1¼-in.	+ 4½	+32½
2-in.	— 1½	+29
3-in.	— 2	+28½
Wrought Iron, lapweld		
2-in.	+ 7½	+36½
2½ to 3½-in.	+ 5	+32
4-in.	list	+36
4½ to 8-in.	+ 2	+27½

EXTRA STRONG, PLAIN ENDS

Steel, buttweld		
⅛-in.	42 to 40	20½ to 18½
¼-in.	46 to 44	24½ to 22½
⅜-in.	48 to 46	27½ to 25½
1¼-in.	48½ to 46½	28 to 26
1½-in.	49 to 47	28½ to 26½
2-in.	49½ to 47½	29 to 27
2½ to 3-in.	50 to 48	29½ to 27½
Steel, lapweld		
2-in.	39½	18½
2½ to 3-in.	44½	23½
3½ to 6-in.	48 to 44	23 to 27
Steel, seamless		
2-in.	37½ to 32½	16½ to 11½
2½ to 3-in.	41½ to 36½	20½ to 15½
3½ to 6-in.	45	24
Wrought Iron, buttweld		
⅛-in.	+16	+46½
¼-in.	+ 9½	+39½
1 to 2-in.	— 1½	+28½
Wrought Iron, lapweld		
2-in.	+ 4½	+33
2½ to 4-in.	— 5	+21½
4½ to 6-in.	— 1	+26

For threads only, buttweld, lapweld and seamless pipe, one point higher discount (lower price) applies. For plain ends, buttweld, lapweld and seamless pipe 3-in. and smaller, three points higher discount (lower price) applies, while for lapweld and seamless 3½-in. and larger four points higher discount (lower price) applies. On buttweld and lapweld steel pipe, jobbers are granted a discount of 5 pct. On l.c.l. shipments, prices are determined by adding 25 pct and 30 pct and the carload freight rate to the base card.

BOILER TUBES

Seamless steel and electric welded commercial boiler tubes and locomotive tubes, minimum wall. Prices per 100 ft at mill in carload lots, cut length 4 to 24 ft inclusive.

OD in in.	Gage BWG	Seamless H.R.	Seamless C.R.	Electric Weld H.R.	Electric Weld C.D.
2	13	19.18	22.56	18.60	21.89
2½	12	25.79	30.33	25.02	29.41
3	12	28.62	33.76	27.82	32.74
3½	11	35.85	42.20	34.78	40.94
4	10	44.51	52.35	43.17	50.78

CAST IRON WATER PIPE

Per net ton

6 to 24-in., del'd Chicago $106.70
6 to 24-in., del'd N. Y. ..... 103.50 to 108.40
6 to 24-in., Birmingham 93.50
6-in. and larger, f.o.b. cars, San Francisco, Los Angeles, for all rail shipment; rail and water shipment less 120.30

Class "A" and gas pipe, $5 extra; 4-in. pipe is $5 a ton above 6-in.

BOLTS, NUTS, RIVETS, SET SCREWS

Consumer Prices

(Bolts and nuts f.o.b. mill Pittsburgh, Cleveland, Birmingham or Chicago)

Base discount less case lots

Machine and Carriage Bolts

Pct Off List

½ in. & smaller x 6 in. & shorter	35
9/16 & ⅝ in. x 6 in. & shorter	37
¾ in. & larger x 6 in. & shorter	34
All diam, longer than 6 in.	30
Lag, all diam over 6 in. longer	35
Lag, all diam x 6 in. & shorter	37
Plow bolts	47

Nuts, Cold Punched or Hot Pressed

(Hexagon or Square)

½ in. and smaller	35
9/16 to 1 in. inclusive	34
1⅛ to 1½ in. inclusive	32
1⅝ in. and larger	27

On above bolts and nuts, excepting plow bolts, additional allowance of 15 pct for full container quantities. There is an additional 5 pct allowance for carload shipments.

Semifinished Hexagon Nuts

	USS	SAE
7/16 in. and smaller	..	41
½ in. and smaller	38	..
⅝ in. through 1 in.	..	39
9/16 in. through 1 in.	37	..
1⅛ in. through 1½ in.	35	37
1⅝ in. and larger	28	..

In full case lots, 15 pct additional discount.

Stove Bolts

Packages, nuts separate	$61.75
In bulk	70.00

Large Rivets

(½ in. and larger)
Base per 100 lb

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$6.75
F.o.b. Lebanon, Pa.	6.75

Small Rivets

(7/16 in. and smaller)
Pct off List

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	48

Cap and Set Screws

(In packages) — *Pct Off List*

Hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in., SAE 1020, bright	46
⅝ to 1 in. x 6 in., SAE (1035), heat treated	35
Milled studs	19
Flat head cap screws, listed sizes	5
Fillister head cap, listed sizes	28

FLUORSPAR

Washed gravel fluorspar, f.o.b. cars, Rosiclare, Ill.

Effective CaF, Content:	*Base price per net ton*
70% or more	$37.00
60% or less	34.00

LAKE SUPERIOR ORES

(51.50% Fe, Natural Content, Delivered Lower Lake Ports)

	Per Gross Ton
Old range, bessemer	$7.60
Old range, nonbessemer	7.45
Mesabi, bessemer	7.35
Mesabi, nonbessemer	7.20
High phosphorus	7.20

After Dec. 31, 1948, increases or decreases in Upper Lake freight, dock and handling charges and taxes thereon to be for the buyers' account.

METAL POWDERS

Per pound, f.o.b. shipping point, in ton lots, for minus 100 mesh.

Swedish sponge iron c.i.f. New York, ocean bags	7.3¢ to 9.0¢
Domestic sponge iron, 98+% Fe, carload lots	9.0¢ to 15.0¢
Electrolytic iron, annealed, 99.5+% Fe	31.5¢ to 39.5¢
Electrolytic iron, unannealed, minus 325 mesh, 99+% Fe	48.5¢
Hydrogen reduced iron, minus 300 mesh, 98+% Fe.	63.0¢ to 80.0¢
Carbonyl iron, size 5 to 10 microns, 98%, 99.8%+ Fe.	90.0¢ to $1.75
Aluminum	31.00¢
Antimony	51.17¢
Brass, 10 ton lots	27.25 to 37.25¢
Copper, electrolytic	23.625¢
Copper, reduced	24.25¢
Cadmium	93.40
Chromium, electrolytic, 99% min.	$3.50
Lead	28.00¢
Manganese	60.00¢
Molybdenum, 99%	$2.45
Nickel, unannealed	67.00¢
Nickel, spherical, minus 30 mesh, unannealed	68.00¢
Silicon	34.00¢
Solder powder	8.5¢ plus metal cost
Stainless steel, 302	75.0¢
Tin	$1.15
Tungsten, 99%	$2.90
Zinc, 10 ton lots	17.75 to 22.25¢

COKE

	Net Ton
Furnace, beehive (f.o.b. oven) Connellsville, Pa.	$14.00 to $15.00
Foundry, beehive (f.o.b. oven) Connellsville, Pa.	$16.00 to $17.00
Foundry, Byproduct	
Buffalo, del'd	$22.95
Chicago, f.o.b.	20.40
Detroit, f.o.b.	19.40
New England, del'd	23.35
Seaboard, N. J., f.o.b.	21.50
Philadelphia, f.o.b.	21.05
Swedeland, Pa., f.o.b.	21.00
Painesville, Ohio, f.o.b.	20.90
Erie, del'd	$21.50 to 23.50
Cleveland, del'd	22.45
Cincinnati, del'd	21.50
St. Paul, f.o.b.	23.50
St. Louis, del'd	20.98
Birmingham, del'd	18.66

REFRACTORIES

(F.o.b. Works)

	Carloads, Per 1000
Fire Clay Brick	
First quality, Pa., Md., Ky., Mo., Ill. (except Salina, Pa., add $5)	$80.00
No. 1 Ohio	74.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	74.00
No. 2 Ohio	66.00
Ground fire clay, net ton, bulk (except Salina, Pa., add $1.50)	11.50
Silica Brick	
Mt. Union, Pa., Ensley, Ala.	$80.00
Childs, Pa.	84.00
Hays, Pa.	85.00
Chicago District	89.00
Western, Utah and Calif.	95.00
Super Duty, Hays, Pa., Athens, Tex.	85.00
Silica cement, net ton, bulk, Eastern (except Hays, Pa.)	$13.75 to 14.00
Silica cement, net ton, bulk, Hays, Pa.	16.00
Silica cement, net ton, bulk, Ensley, Ala.	15.00
Silica cement, net ton, bulk, Chicago District	14.75
Silica cement, net ton, bulk, Utah and Calif.	21.00
Chrome Brick	*Per Net Ton*
Standard chemically bonded, Balt., Chester	$69.00
Magnesite Brick	
Standard, Balt. and Chester	$91.00
Chemically bonded, Balt. and Chester	80.00
Grain Magnesite	*Std. ⅜-in. grains*
Domestic, f.o.b. Balt. and Chester, in bulk, fines removed	$56.50
Domestic, f.o.b. Chewelah, Wash., in bulk with fines	$30.50 to 31.00
in sacks with fines	35.00 to 35.50
Dead Burned Dolomite	
F.o.b. producing points in Pennsylvania, West Virginia and Ohio, per net ton, bulk. Midwest, add 10¢; Missouri Valley, add 20¢	$12.25

WAREHOUSE PRICES

Base prices, f.o.b. warehouse, dollars per 100 lb. (Metropolitan area delivery, add 15¢ to base price except Cincinnati and New Orleans (5), add 10¢; New York, add 30¢.)

CITIES	SHEETS			STRIP		PLATES	SHAPES	BARS		ALLOY BARS			
	Hot-Rolled	Cold-Rolled (18 gage)	Galvanized (10 gage)	Hot-Rolled	Cold-Rolled		Standard Structural	Hot-Rolled	Cold-Finished	Hot-Rolled, A 4815 As-rolled	Hot-Rolled, A 4140-50 Ann.	Cold-Drawn, A 4815 As-rolled	Cold-Drawn, A 4140-50 Ann.
Baltimore	5.31	6.21-6.41	6.95-7.11	5.37	....	5.56	5.38	5.42	6.16	....	10.10	....	....
Birmingham	5.05	....	6.45	5.05	6.68	5.25	5.00	5.00	6.68	....	....	....	....
Boston	5.55	6.45-6.75	7.71-7.85	5.65-5.95	6.75	5.80	5.42	5.52	6.27	9.64-9.82	10.04-10.07	11.23-11.27	11.47-11.52
Buffalo	4.85	5.00-5.75	7.26-7.70	5.25-5.65	6.35-7.27	5.35	5.10	5.05-5.15	5.80	9.70-9.73	9.95-9.98	11.15-11.18	11.40-11.43
Chicago	4.85	5.75	7.10	4.85	6.68	5.10	.90	4.90	5.70	9.35-9.50	9.60-9.75	10.80-10.90	11.05-11.15
Cincinnati	5.16-5.28[5]	6.13[5]-6.18	7.53	5.28[5]-5.55	....	5.53[5]-5.63	5.46[5]-5.48	5.33[5]-5.85	6.09[5]-6.10	9.74	9.99	11.19	11.44
Cleveland	4.98-5.16	5.75-6.06	7.20-7.46	5.03-5.15	....	5.37-5.54	5.16-5.47	5.17-5.34	5.90-5.97	9.49-9.66	9.74-9.91	10.95-11.07	11.19-11.32
Detroit	5.25-5.32	6.07-6.18	7.53-7.56	5.29-5.47	6.27-6.58	5.53-5.57	5.40	5.33-5.55	6.01-6.10	9.68-9.82	9.94-10.07	11.11-11.14	11.35-11.39
Follansbee	4.85	5.75	7.15	....	6.00	....	....	....	....	....	....	....	....
Houston	6.50-6.70	....	8.50	7.00	....	6.70	6.55	6.65	7.60	10.30	10.25	11.45	11.70
Indianapolis	5.15	6.05	7.39	5.15	6.25	5.40	5.20	5.35	6.50	....	....	....	....
Los Angeles	6.45-6.60	7.90-8.05	8.75-8.90	6.85-6.80	9.35[5]	6.15-7.60	5.95-6.10	6.10-6.25	7.95[14]-9.35	10.90-11.60	10.85-11.55	12.40-12.95	12.65-13.20
Memphis	5.75	6.60	....	5.95	6.80	5.95	5.75	5.75	6.50	....	....	....	....
Milwaukee	5.03	5.93	7.28	5.38	6.86	5.28	5.08	5.08	5.87-5.88	9.53	9.78	10.98	11.23
New Orleans	5.95[5]	6.75[5]	....	6.15[5]	....	6.15[5]	5.95[5]	5.95[5]	6.65[5]	....	....	....	....
New York	5.40-5.51	6.46	7.71-7.86	5.62-5.72	....	5.70-5.81	5.33-5.61	5.57-5.60	6.41	9.73-9.91	9.98-10.16	11.18	11.43
Norfolk	5.80	....	....	6.05	....	6.05	6.05	6.05	7.05	....	....	....	....
Omaha	5.92	....	9.18	5.92	....	6.17	5.97	5.97	6.77	....	....	....	....
Philadelphia	5.15-5.44	6.36-6.79	7.33-7.43	5.35-5.45	6.74	5.38	5.10	5.40-5.45	6.19	9.50	9.75-10.34	10.95	11.20
Pittsburgh	4.85-4.90	5.75[1]	7.15-7.70	5.10	8.00	5.20-5.25	4.95-5.15	5.00-5.10	5.65	9.35	9.60	10.40	11.30
Portland	6.50[5]-6.80	8.00[1]	8.80-9.20	6.85[5]	....	6.30[5]	6.35[5]	6.35[5]	8.25[14]	10.50[6]	10.10[6]	....	....
Salt Lake City	7.05-8.00	8.20	7.90-9.06	7.10-7.70	....	5.75-6.85	6.65-7.00	6.95-7.25	7.40-7.55	....	....	....	....
San Francisco	5.95-6.00	7.15-7.85	8.25-8.70	6.75	....	7.60	5.90	5.90	7.55	10.90	10.85	10.40	12.65
Seattle	6.20[4]-7.10[4]	7.75[2]-8.65[2]	7.65-9.15[2]	6.55[4]-6.70[4]	....	6.20-6.35[4]	6.15-6.30[4]	6.05[4]-6.20[4]	8.00[14]-8.15[14]	....	10.30[15]-11.35[15]	....	12.00[15]-14.10[15]
St. Louis	5.21-5.37	6.12-6.27	7.47-7.52	5.22-5.97	8.68	5.47-5.62	5.27-5.42	5.27-5.92	6.07-6.22	9.72	9.97	....	11.42
St. Paul	5.44	6.19-6.34	7.74	5.44	6.82	5.64-6.69	5.49	5.49	6.29	....	....	....	....

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT-ROLLED:
Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD-ROLLED:
Sheets, 400 to 1999 lb; strip, extras on all quantities bars 1000 lb and over.

ALLOY BARS:
1000 to 1999 lb.

GALVANIZED SHEETS:
450 to 1499 lb.

EXCEPTIONS:
(1) 400 to 1499 lb; (2) 450 to 1499 lb; (3) 300 to 4999 lb; (4) 300 to 9999 lb; (5) 2000 lb and over; (6) 1000 lb and over; (7) 400 to 14,999 lb; (8) 400 lb and over; (9) 500 to 1999 lb; (10) 500 to 999 lb; (11) 400 to 3999 lb; (12) 450 to 3749 lb; (13) 400 to 1999 lb; (14) 1500 lb and over; (15) 1000 to 4999 lb; (16) 4000 lb and over; (17) up to 1999 lb; (18) 1000 to 1499 lb.

PIG IRON PRICES

Dollars per gross ton. Delivered prices represent minimums. Delivered prices do not include 3 pct tax on freight nor the 6 pct increase on total freight charges in the Eastern Zone (5 pct Southern Zone, 4 pct Western Zone), effective Jan. 11, 1949.

PRODUCING POINT PRICES

Producing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Bethlehem	48.00	.....	.....	.....	.....
Birmingham	42.88	43.38	.....	.....	.....
Buffalo	47.00	47.00	47.50	.....	.....
Chicago	46.00	46.50	46.50	47.00	.....
Cleveland	46.00	46.50	46.50	47.00	51.00
Duluth	46.00	46.50	46.50	47.00	.....
Erie	46.00	46.50	46.50	47.00	.....
Everett	.....	52.75	53.25	.....	.....
Granite City	47.90	48.40	48.90	.....	.....
Ironton, Utah	46.00-55.50	46.50-55.50	.....	.....	.....
Lone Star, Texas	50.00	50.50†	.....	.....	.....
Neville Island	46.00	46.50	46.50	.....	.....
Geneva, Utah	46.00	46.50	.....	.....	.....
Sharpsville	46.00	46.50	46.50	47.00	.....
Steelton	46.00	46.50	49.00	49.50	54.00
Struthers, Ohio	46.00	.....	.....	.....	.....
Swedeland	50.00	50.50	51.00	51.50	.....
Toledo	46.00	46.50	46.50	47.00	.....
Troy, N. Y.	.....	.....	.....	.....	54.00
Youngstown	46.00	46.50	46.50	.....	.....

DELIVERED PRICES (BASE GRADES)

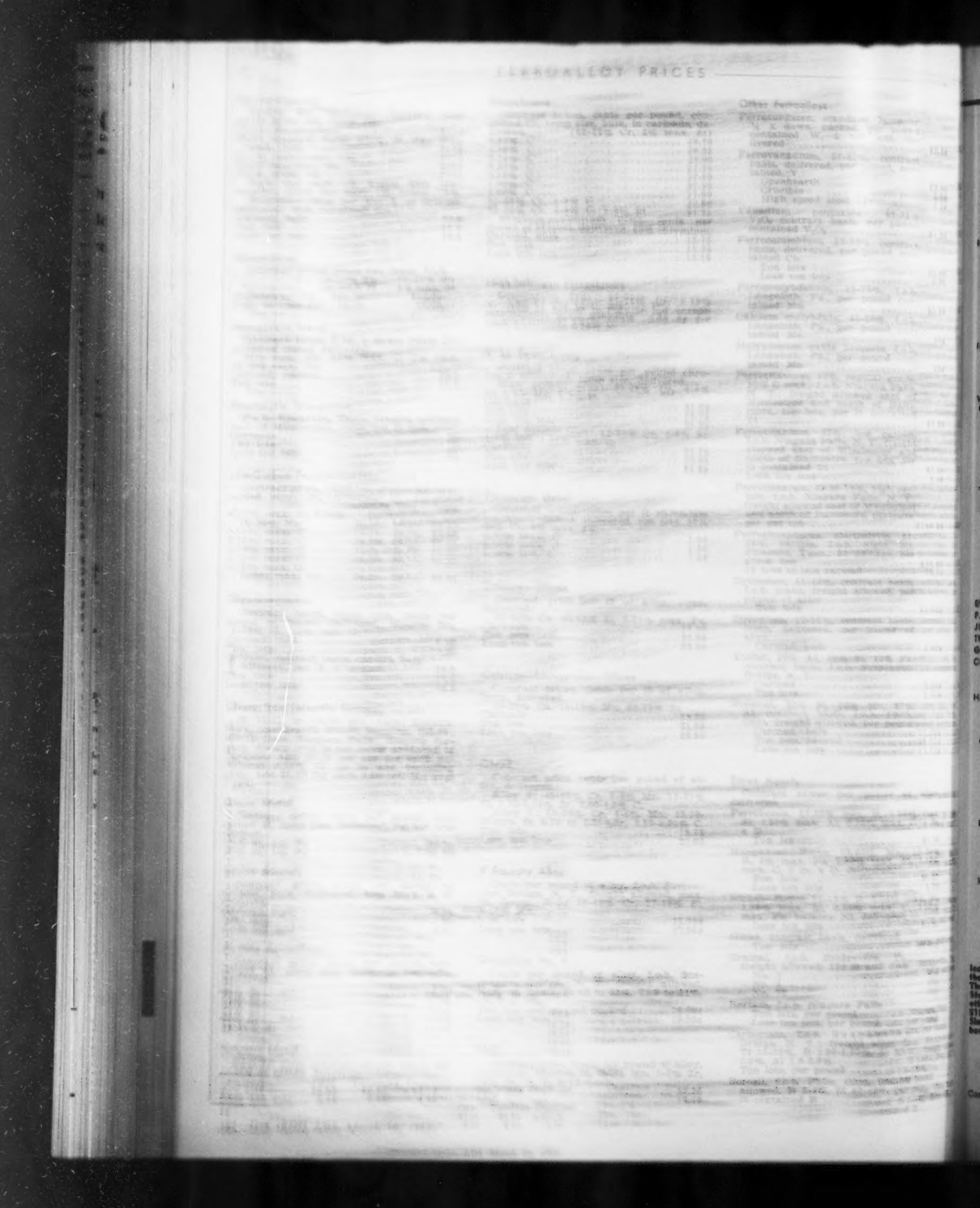
Consuming Point	Producing Point	Freight Rate	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Boston	Everett	$0.50 Arb.	.....	52.75	53.25	.....	.....
Boston	Steelton	6.27	54.27	54.77	55.27	55.77	60.27
Brooklyn	Bethlehem	3.90	51.90	.....	.....	.....	.....
Cincinnati	Birmingham	6.09	48.97	49.46	.....	.....	.....
Jersey City	Bethlehem	2.39	50.39	.....	.....	.....	.....
Los Angeles	Geneva-Ironton	6.93	52.93-61.93	53.43-43	.....	.....	.....
Mansfield	Cleveland-Toledo	3.03	49.03-48.53	49.53-49.03	49.53	50.03	54.93
Philadelphia	Bethlehem	2.21	50.21	.....	.....	.....	.....
Philadelphia	Swedeland	1.31	51.31	51.81	52.31	52.81	.....
Philadelphia	Steelton	2.81	50.81	51.31	51.81	52.31	56.81
San Francisco	Geneva-Ironton	6.93	52.93-61.93	53.43-62.43	.....	.....	.....
Seattle	Geneva-Ironton	6.93	52.93-61.93	53.43-62.43	.....	.....	.....
St. Louis	Granite City	0.75 Arb.	48.65	49.15	49.65	.....	.....

† Low Phos, Southern Grade

Producing point prices are subject to switching charges; silicon differential (not to exceed 50¢ per ton for each 0.25 pct silicon content in excess of base grade which is 1.75 to 2.25 pct for foundry iron); phosphorus differentials, a reduction of 38¢ per ton for phosphorus content of 0.70 pct and over manganese differentials, a charge not to exceed 50¢ per ton for each 0.50 pct manganese content in excess of 1.00 pct. $2 per ton extra may be charged for 0.5 to 0.75 pct nickel content and $1 per ton extra for each additional 0.25 pct nickel.

Silvery iron (blast furnace) silicon 6.00 to 6.50 pct. C/L per g.t., f.o.b. Jackson, Ohio —$59.50; f.o.b. Buffalo, $60.75. Add $125 per ton for each additional 0.50 pct Si up to 12 pct. Add 50¢ per ton for each 0.50 pct Mn over 1.00 pct. Add $1.00 per ton for 0.75 pct or more P. Bessemer ferrosilicon prices are $1.00 per ton above silvery iron prices of comparable analysis.

Charcoal pig iron base price for low phosphorus $66.00 per gross ton, f.o.b. Lyles, Tenn. Delivered Chicago, $73.78. High phosphorus charcoal pig iron is not being produced.



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Ferromanganese

78-82% Mn, Maximum contract base price, gross ton, lump size.

F.o.b. Birmingham	$174
F.o.b. Niagara Falls, Alloy, W. Va., Welland, Ont.	$160
F.o.b. Johnstown, Pa.	$174
F.o.b. Sheridan, Pa.	$172
F.o.b. Etna, Pa.	$163

$2.00 for each 1% above 82% Mn; penalty, $2.00 for each 1% below 78%.

Briquets—Cents per pound of briquet, delivered, 66% contained Mn.

Carload, bulk	10.0
Ton lots	11.6
Less ton lots	12.5

Spiegeleisen

Contract prices gross ton, lump, f.o.b.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Palmerton, Pa.	$61.00	$62.00
Pgh. or Chicago	65.00	66.00

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, delivered.

96% min. Mn, 0.2% max. C, 1% max. Si, 2% max. Fe.

Carload, packed	35.5
Ton lots	37.0

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.

Carloads	28
Ton lots	30
Less ton lots	32

Low-Carbon Ferromanganese

Contract price, cents per pound Mn contained, lump size, delivered.

	Carloads	Ton	Less
0.07% max. C, 0.06% P, 90% Mn	25.25	27.10	28.30
0.10% max. C	24.75	26.60	27.80
0.15% max. C	24.25	26.10	27.30
0.30% max. C	23.75	25.60	26.80
0.50% max. C	23.25	25.10	26.30
0.75% max. C, 7.00% max. Cl	20.25	22.10	23.30

Silicomanganese

Contract basis, lump size, cents per pound of metal, delivered, 65-68% Mn, 18-20% Si, 1.5% max. C.

Carload bulk	8.60
Ton lots	10.25
Briquet, contract basis, carlots, bulk delivered, per lb of briquet	10.0
Ton lots	11.6
Less ton lots	12.5

Silvery Iron (electric furnace)

Si 14.01 to 14.50 pct, f.o.b. Keokuk, Iowa, openhearth $84.00, foundry, $85.00; $84.75 f.o.b. Niagara Falls; Electric furnace silvery iron is not being produced at Jackson. Add $1.00 per ton for each additional 0.50% Si up to and including 18%. Add $1.00 for each 0.50 pct. Mn over 1 pct.

Silicon Metal

Contract price, cents per pound contained Si, lump size, delivered, for ton lots packed.

96% Si, 2% Fe	20.70
97% Si, 1% Fe	21.10

Silicon Briquets

Contract price, cents per pound of briquet, bulk, delivered, 40% Si, 1 lb Si briquets.

Carload, bulk	6.30
Ton lots	7.90
Less ton lots	8.80

Electric Ferrosilicon

Contract price, cents per pound contained Si, lump size, bulk, in carloads, delivered.

25% Si	18.50
50% Si	11.30
75% Si	13.50
85% Si	14.65
90-95% Si	16.50

Calcium Metal

Eastern zone contract prices, cents per pound of metal, delivered.

	Cast	Turnings	Distilled
Ton lots	$2.05	$2.95	$3.75
Less ton lots	2.40	3.30	4.55

Ferrochrome

Contract prices, cents per pound, contained Cr, lump size, bulk, in carloads, delivered. (65-72% Cr, 2% max. Si)

0.06% C	28.75
0.10% C	28.25
0.15% C	28.00
0.20% C	27.75
0.50% C	27.50
1.00% C	27.25
2.00% C	27.00
65-69% Cr, 4-9% C	20.50
62-66% Cr, 4-6% C, 6-9% Si	21.35

Briquets — Contract price, cents per pound of briquet, delivered, 60% chromium.

Carload, bulk	13.75
Ton lots	15.25
Less ton lots	16.15

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome price schedule. Add 5¢ for each additional 0.25% N.

S. M. Ferrochrome

Contract price, cents per pound chromium contained, lump size, delivered.

High carbon type: 60.65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.

Carloads	21.60
Ton lots	23.75
Less ton lots	25.25

Low carbon type: 62-66% Cr, 4-6% Si, 4-6% Mn, 1.25% max. C.

Carloads	27.75
Ton lots	30.05
Less ton lots	31.85

Chromium Metal

Contract prices, cents per lb chromium contained packed, delivered, ton lots. 97% min. Cr, 1% max. Fe.

0.20% max. C	1.09
0.50% max. C	1.05
9.00% min. C	1.04

Calcium—Silicon

Contract price per lb of alloy, lump, delivered.

30-33% Ca, 60.65% Si, 3.00% max. Fe.

Carloads	17.90
Ton lots	21.00
Less ton lots	22.50

Calcium—Manganese—Silicon

Contract prices, cents per lb of alloy, lump, delivered.

16-20% Ca, 14-18% Mn, 53-59% Si.

Carloads	19.25
Ton lots	21.55
Less ton lots	22.55

CMSZ

Contract price, cents per pound of alloy, delivered.

Alloy 4: 45-49% Cr, 4-6% Mn, 18-21% Si, 1.25-1.75% Zr, 3.00-4.5% C.

Alloy 5: 50-56% Cr, 4-6% Mn, 13.50-16.00% Si, 0.75 to 1.25%Zr, 3.50-5.00% C.

Ton lots	19.75
Less ton lots	21.00

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis. V-5: 38-42% Cr, 17-19% Si, 8-11% Mn.

Ton lots	15.75¢
Less ton lots	17.00¢

Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis. Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.

Ton lots and carload packed	18.00¢
Less ton lots	19.50¢

SMZ

Contract price, cents per pound of alloy, delivered. 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe, ½ in. x 12 mesh.

Ton lots	17.25
Less ton lots	18.50

Other Ferroalloys

Ferrotungsten, standard, lump or ¼ x down, packed, per pound contained W, 5 ton lots, delivered	$2.25
Ferrovanadium, 35-55%, contract basis, delivered, per pound, contained, V.	
Openhearth	$2.90
Crucible	3.00
High speed steel (Primos)	3.10
Vanadium pentoxide, 88-92% V_2O_5 contract basis, per pound contained V_2O_5	$1.20
Ferrocolumbium, 50-60% contract basis, delivered, per pound contained Cb.	
Ton lots	$2.90
Less ton lots	2.95
Ferromolybdenum, 55-75%, f.o.b. Langeloth, Pa., per pound contained Mo.	$1.10
Calcium molybdate, 45-50%, f.o.b. Langeloth, Pa., per pound contained Mo.	96¢
Molybdenum oxide briquets, f.o.b. Langeloth, Pa., per pound contained Mo.	95¢
Ferrotitanium, 40%, regular grade, 10% C max., f.o.b. Niagara Falls, N. Y., freight allowed east of Mississippi and north of Baltimore, ton lots, per lb contained Ti	$1.28
Ferrotitanium, 25%, low carbon, f.o.b. Niagara Falls, N. Y., freight allowed east of Mississippi and north of Baltimore, ton lots, per lb contained Ti	$1.40
Less ton lots	1.45
Ferrotitanium, 15 to 19%, high carbon, f.o.b. Niagara Falls, N. Y., freight allowed east of Mississippi and north of Baltimore, carloads, per net ton	$160.00
Ferrophosphorus, electrolytic, 23-26%, carlots, f.o.b. Siglo, Mt. Pleasant, Tenn., $3 unitage, per gross ton	$65.00
10 tons to less carload	75.00
Zirconium, 35-40%, contract basis, f.o.b. plant, freight allowed, per pound of alloy.	
Ton lots	21.00¢
Zirconium, 12-15%, contract basis, lump, delivered, per pound of alloy.	
Carload, bulk	6.60¢
Alsifer, 20% Al, 40% Si, 40% Fe, contract basis, f.o.b. Suspension Bridge, N. Y.	
Carload	8.90¢
Ton lots	9.80¢
Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound	
Carload, bulk	11.00¢
Ton lots, packed	11.25¢
Less ton lots	11.75¢

Boron Agents

Contract prices per pound of alloy, delivered.

Ferroboron, 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D.	
Ton lot	$1.20
Manganese—Boron 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, delivered.	
Ton lots	$1.67
Less ton lots	1.79
Nickel—Boron 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, delivered.	
Less ton lots	$1.80
Silcaz, contract basis, delivered.	
Ton lots	45.00¢
Grainal, f.o.b. Bridgeville, Pa., freight allowed, 100 lb and over.	
No. 1	93¢
No. 6	63¢
No. 79	45¢
Bortam, f.o.b. Niagara Falls	
Ton lots, per pound	45¢
Less ton lots, per pound	50¢
Carbortam, f.o.b. Suspension Bridge, N. Y.; freight allowed, Ti 15-18%, B 1.00-1.50%, Si 2.5-3.0%, Al 1.0-2.0%.	
Ton lots, per pound	8.625¢
Borosil, f.o.b. Philo, Ohio, freight allowed, B 3-4%, Si 40-45%, per lb contained B	$6.25